INSTALLATION AND OPERATION MANUAL

MiTOP-E1/T1

SFP-Format TDM Pseudowire Gateway

Version 1.0

TDMoIP Driven®

RAD data communications

The Access Company

MiTOP-E1/T1

SFP-Format TDM Pseudowire Gateway

Version 1.0

Installation and Operation Manual

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For further information contact RAD at the address below or contact your local distributor.

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RAD warrants to DISTRIBUTOR that the hardware in the MiTOP-E1/T1 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

RAD shall be released from all obligations under its warranty in the event that the equipment has been subjected to misuse, neglect, accident or improper installation, or if repairs or modifications were made by persons other than RAD's own authorized service personnel, unless such repairs by others were made with the written consent of RAD.

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DISTRIBUTOR shall be responsible to its customers for any and all warranties which it makes relating to MiTOP-E1/T1 and for ensuring that replacements and other adjustments required in connection with the said warranties are satisfactory.

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This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

Product Disposal

To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit's use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

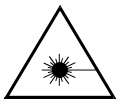
Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective ground: the marked lug or terminal should be connected to the building protective ground bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

- Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
- Do not attempt to adjust the laser drive current.
- Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
- The use of optical devices with the equipment will increase eye hazard.
- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective ground terminal. If a ground lug is provided on the product, it should be connected to the protective ground at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The grounding and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk,

there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good ground connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the ground bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Das vorliegende Gerät fällt unter die Funkstörgrenzwertklasse A. In Wohngebieten können beim Betrieb dieses Gerätes Rundfunkströrungen auftreten, für deren Behebung der Benutzer verantwortlich ist.

Mise au rebut du produit

Afin de faciliter la réutilisation, le recyclage ainsi que d'autres formes de récupération d'équipement mis au rebut dans le cadre de la protection de l'environnement, il est demandé au propriétaire de ce produit RAD de ne pas mettre ce dernier au rebut en tant que déchet municipal non trié, une fois que le produit est arrivé en fin de cycle de vie. Le client devrait proposer des solutions de réutilisation, de recyclage ou toute autre forme de mise au rebut de cette unité dans un esprit de protection de l'environnement, lorsqu'il aura fini de l'utiliser.

Instructions générales de sécurité

Les instructions suivantes servent de guide général d'installation et d'opération sécurisées des produits de télécommunications. Des instructions supplémentaires sont éventuellement indiquées dans le manuel.

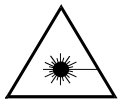
Symboles de sécurité

Avertissement

Ce symbole peut apparaitre sur l'équipement ou dans le texte. Il indique des risques potentiels de sécurité pour l'opérateur ou le personnel de service, quant à l'opération du produit ou à sa maintenance.

Danger de choc électrique ! Evitez tout contact avec la surface marquée tant que le produit est sous tension ou connecté à des lignes externes de télécommunications.

Mise à la terre de protection : la cosse ou la borne marquée devrait être connectée à la prise de terre de protection du bâtiment.



Avertissement

Certains produits peuvent être équipés d'une diode laser. Dans de tels cas, une étiquette indiquant la classe laser ainsi que d'autres avertissements, le cas échéant, sera jointe près du transmetteur optique. Le symbole d'avertissement laser peut aussi être joint.

Veuillez observer les précautions suivantes :

- Avant la mise en marche de l'équipement, assurez-vous que le câble de fibre optique est intact et qu'il est connecté au transmetteur.
- Ne tentez pas d'ajuster le courant de la commande laser.
- N'utilisez pas des câbles ou connecteurs de fibre optique cassés ou sans terminaison et n'observez pas directement un rayon laser.
- L'usage de périphériques optiques avec l'équipement augmentera le risque pour les yeux.
- L'usage de contrôles, ajustages ou procédures autres que celles spécifiées ici pourrait résulter en une dangereuse exposition aux radiations.

ATTENTION : Le rayon laser peut être invisible !

Les utilisateurs pourront, dans certains cas, insérer leurs propres émetteurs-récepteurs Laser SFP dans le produit. Les utilisateurs sont avertis que RAD ne pourra pas être tenue responsable de tout dommage pouvant résulter de l'utilisation d'émetteurs-récepteurs non conformes. Plus particulièrement, les utilisateurs sont avertis de n'utiliser que des produits approuvés par l'agence et conformes à la réglementation locale de sécurité laser pour les produits laser de classe 1.

Respectez toujours les précautions standards de sécurité durant l'installation, l'opération et la maintenance de ce produit. Seul le personnel de service qualifié et autorisé devrait effectuer l'ajustage, la maintenance ou les réparations de ce produit. Aucune opération d'installation, d'ajustage, de maintenance ou de réparation ne devrait être effectuée par l'opérateur ou l'utilisateur.

Manipuler des produits sous tension

Règles générales de sécurité

Ne pas toucher ou altérer l'alimentation en courant lorsque le câble d'alimentation est branché. Des tensions de lignes peuvent être présentes dans certains produits, même lorsque le commutateur (s'il est installé) est en position OFF ou si le fusible est rompu. Pour les produits alimentés par CC, les niveaux de tension ne sont généralement pas dangereux mais des risques de courant peuvent toujours exister.

Avant de travailler sur un équipement connecté aux lignes de tension ou de télécommunications, retirez vos bijoux ou tout autre objet métallique pouvant venir en contact avec les pièces sous tension.

Sauf s'il en est autrement indiqué, tous les produits sont destinés à être mis à la terre durant l'usage normal. La mise à la terre est fournie par la connexion de la fiche principale à une prise murale équipée d'une borne protectrice de mise à la terre. Si une cosse de mise à la terre est fournie avec le produit, elle devrait être connectée à tout moment à une mise à la terre de protection par un conducteur de diamètre 18 AWG ou plus. L'équipement monté en châssis ne devrait être monté que sur des châssis et dans des armoires mises à la terre.

Branchez toujours la mise à la terre en premier et débranchez-la en dernier. Ne branchez pas des câbles de télécommunications à un équipement qui n'est pas mis à la terre. Assurez-vous que tous les autres câbles sont débranchés avant de déconnecter la mise à la terre.

Connexion au courant du secteur

Assurez-vous que l'installation électrique est conforme à la réglementation locale.

Branchez toujours la fiche de secteur à une prise murale équipée d'une borne protectrice de mise à la terre.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A. Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A.

Branchez toujours le câble d'alimentation en premier à l'équipement puis à la prise murale. Si un commutateur est fourni avec l'équipement, fixez-le en position OFF. Si le câble d'alimentation ne peut pas être facilement débranché en cas d'urgence, assurez-vous qu'un coupe-circuit ou un disjoncteur d'urgence facilement accessible est installé dans l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si le système de distribution de courant est de type IT.

Connexion d'alimentation CC

Sauf s'il en est autrement spécifié dans le manuel, l'entrée CC de l'équipement est flottante par rapport à la mise à la terre. Tout pôle doit être mis à la terre en externe.

A cause de la capacité de courant des systèmes à alimentation CC, des précautions devraient être prises lors de la connexion de l'alimentation CC pour éviter des courts-circuits et des risques d'incendie.

Les unités CC devraient être installées dans une zone à accès restreint, une zone où l'accès n'est autorisé qu'au personnel qualifié de service et de maintenance.

Assurez-vous que l'alimentation CC est isolée de toute source de courant CA (secteur) et que l'installation est conforme à la réglementation locale.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A. Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A.

Avant la connexion des câbles d'alimentation en courant CC, assurez-vous que le circuit CC n'est pas sous tension. Localisez le coupe-circuit dans le tableau desservant l'équipement et fixez-le en position OFF. Lors de la connexion de câbles d'alimentation CC, connectez d'abord le conducteur de mise à la terre à la borne correspondante, puis le pôle positif et en dernier, le pôle négatif. Remettez le coupe-circuit en position ON.

Un disjoncteur facilement accessible, adapté et approuvé devrait être intégré à l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si l'alimentation en courant CC est flottante.

Glossary

Address	A coded representation of the origin or destination of data.
Attenuation	Signal power loss through equipment, lines or other transmission devices. Measured in decibels.
AWG	The American Wire Gauge System, which specifies wire width.
Balanced	A transmission line in which voltages on the two conductors are equal in magnitude, but opposite in polarity, with respect to ground.
Bandwidth	The range of frequencies passing through a given circuit. The greater the bandwidth, the more information can be sent through the circuit in a given amount of time.
Bipolar	Signaling method in E1/T1 representing a binary "1" by alternating positive and negative pulses, and a binary "0" by absence of pulses.
Bit	The smallest unit of information in a binary system. Represents either a one or zero ("1" or "0").
Bridge	A device interconnecting local area networks at the OSI data link layer, filtering and forwarding frames according to media access control (MAC) addresses.
Buffer	A storage device. Commonly used to compensate for differences in data rates or event timing when transmitting from one device to another. Also used to remove jitter.
Byte	A group of bits (normally 8 bits in length).
Cell	The 53-byte basic information unit within an ATM network. The user traffic is segmented into cells at the source and reassembled at the destination. An ATM cell consists of a 5-byte ATM header and a 48-byte ATM payload, which contains the user data.
Channel	A path for electrical transmission between two or more points. Also called a link, line, circuit or facility.
Circuit Emulation Service	New technology for offering circuit emulation services over packet-switched networks. The service offers traditional TDM trunking (at n x 64 kbps, fractional E1/T1, E1/T1 or E3/T3) over a range of transport protocols, including Internet Protocol (IP), MPLS and Ethernet.
Clock	A term for the source(s) of timing signals used in synchronous transmission.
Data	Information represented in digital form, including voice, text, facsimile and video.

Diagnostics	The detection and isolation of a malfunction or mistake in a communications device, network or system.
Encapsulation	Encapsulating data is a technique used by layered protocols in which a low level protocol accepts a message from a higher level protocol, then places it in the data portion of the lower-level frame. The logistics of encapsulation require that packets traveling over a physical network contain a sequence of headers.
Ethernet	A local area network (LAN) technology which has extended into the wide area networks. Ethernet operates at many speeds, including data rates of 10 Mbps (Ethernet), 100 Mbps (Fast Ethernet), 1,000 Mbps (Gigabit Ethernet), 10 Gbps, 40 Gbps, and 100 Gbps.
Flow Control	A congestion control mechanism that results in an ATM system implementing flow control.
Frame	A logical grouping of information sent as a link-layer unit over a transmission medium. The terms packet, datagram, segment, and message are also used to describe logical information groupings.
Framing	At the physical and data link layers of the OSI model, bits are fit into units called frames. Frames contain source and destination information, flags to designate the start and end of the frame, plus information about the integrity of the frame. All other information, such as network protocols and the actual payload of data, is encapsulated in a packet, which is encapsulated in the frame.
Full Duplex	A circuit or device permitting transmission in two directions (sending and receiving) at the same time.
G.703	An ITU standard for the physical and electrical characteristics of various digital interfaces, including those at 64 kbps and 2.048 Mbps.
Gateway	Gateways are points of entrance and exit from a communications network. Viewed as a physical entity, a gateway is that node that translates between two otherwise incompatible networks or network segments. Gateways perform code and protocol conversion to facilitate traffic between data highways of differing architecture.
Impedance	The combined effect of resistance, inductance and capacitance on a transmitted signal. Impedance varies at different frequencies.
Interface	A shared boundary, defined by common physical interconnection characteristics, signal characteristics, and meanings of exchanged signals.
IP Address	Also known as an Internet address. A unique string of numbers that identifies a computer or device on a TCP/IP network. The format of an IP address is a 32-bit numeric address written as four numbers from 0 to 255, separated by periods (for example, 1.0.255.123).

Jitter	The deviation of a transmission signal in time or phase. It can introduce errors and loss of synchronization in high speed synchronous communications.
Loading	The addition of inductance to a line in order to minimize amplitude distortion. Used commonly on public telephone lines to improve voice quality, it can make the lines impassable to high speed data, and baseband modems.
Loopback	A type of diagnostic test in which the transmitted signal is returned to the sending device after passing through all or part of a communications link or network.
Manager	An application that receives Simple Network Management Protocol (SNMP) information from an agent. An agent and manager share a database of information, called the Management Information Base (MIB). An agent can use a message called a traps-PDU to send unsolicited information to the manager. A manager that uses the RADview MIB can query the RAD device, set parameters, sound alarms when certain conditions appear, and perform other administrative tasks.
Master Clock	The source of timing signals (or the signals themselves) that all network stations use for synchronization.
Network	(1) An interconnected group of nodes. (2) A series of points, nodes, or stations connected by communications channels; the collection of equipment through which connections are made between data stations.
Packet	An ordered group of data and control signals transmitted through a network, as a subset of a larger message.
Payload	The 48-byte segment of the ATM cell containing user data. Any adaptation of user data via the AAL will take place within the payload.
Physical Layer	Layer 1 of the OSI model. The layer concerned with electrical, mechanical, and handshaking procedures over the interface connecting a device to the transmission medium.
Port	The physical interface to a computer or multiplexer, for connection of terminals and modems.
Protocol	A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.
Pseudowire	Point-to-point connections set up to emulate (typically Layer 2) native services like ATM, Frame Relay, Ethernet, TDM, or SONET/SDH over an underlying common packet-switched network (Ethernet, MPLS or IP) core. Pseudowires are defined by the IETF PWE3 (pseudowire emulation edge-to-edge) working group.
Space	In telecommunications, the absence of a signal. Equivalent to a binary 0.

Sync	See **Synchronous Transmission**.
T1	A digital transmission link with a capacity of 1.544 Mbps used in North America. Typically channelized into 24 DS0s, each capable of carrying a single voice conversation or data stream. Uses two pairs of twisted pair wires.
Throughput	The amount of information transferred through the network between two users in a given period, usually measured in the number of packets per second (pps).

Declaration of Conformity

Manufacturer's Name:	RAD Data Communications Ltd.
Manufacturer's Address:	24 Raoul Wallenberg St., Tel Aviv 69719, Israel

declares that the product:

Product Name:	MiTOP-E1/T1

conforms to the following standard(s) or other normative document(s):

EMC:	EN 55022: 2006	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
	EN 50024: 1998 + A1:2001, A2:2003	Information technology equipment – Immunity characteristics – Limits and methods of measurement.
	EN 300 386 V1.3.3 (2005-04)	Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements
	EN 61000-3-2:2000 + A2:2005	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16A per phase).
	EN 61000-3-3:1995 + A1:2001	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16A per phase and not subject to conditional connection.
Safety:	EN 60950-1:2001 + A11:2004	Information technology equipment – Safety – Part 1: General requirements.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 2004/108/EC, the Low Voltage Directive 2006/95/EC and the R&TTE Directive 99/5/EC for wired equipment. The product was tested in a typical configuration.

Tel Aviv, 10 August, 2008

Haim Karshen, VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30, 85521 Ottobrunn-Riemerling, Germany

Quick Start Guide

Installation of MiTOP-E1/T1 should be carried out only by an experienced technician. If you are familiar with MiTOP-E1/T1, use this guide to prepare the unit for operation.

1. Installing MiTOP-E1/T1

Configuring MiTOP-E1/T1 for First Use

Before accessing MiTOP-E1/T1 from the network, connect it to the SFP-CA configuration module and assign an IP address to MiTOP-E1/T1 that complies with your network requirements.

➤ To configure MiTOP-E1/T1 for the first use:

1. Prepare your computer for connection to the SFP-CA configuration module.
2. Install the SFP-CA driver on the PC. The driver installation file, SFP-CA driver for XP.exe, is accessed via the System on an SFP Family page on the Technical Documentation CD.
3. Set MiTOP-E1/T1 to the Configuration mode via its DIP switches.
4. Connect the SFP-CA configuration device to the power using the DC adapter supplied with the unit.
5. Plug MiTOP-E1/T1 into the SFP socket of SFP-CA configuration unit.

Note *Reliable communication link between MiTOP-E1/T1 and SFP-CA is possible only when the MiTOP-E1/T1 OAM parameter (Configuration › Applications › Multiservice over PSN › PW › General Parameters) is set to Enable.*

6. Connect SFP-CA to your PC via USB 2.0 port.
7. Access the MiTOP-E1/T1 management utility, using its default IP address 192.168.205.1, user name (**su**) and password (**1234**).
8. From the Host IP menu (Configuration › System › Management › Host IP), enter the new IP address, the IP mask, and the default gateway values.

Installing MiTOP-E1/T1 into a Host Device

1. Configure MiTOP-E1/T1 for normal operation mode.
2. Insert MiTOP-E1/T1 into a free SFP (MSA-compatible) socket of the host equipment.
3. Press MiTOP-E1/T1 firmly into the MSA SFP port connector.

   MiTOP-E1/T1 is ready to operate.

Connecting the Interfaces

- Connect MiTOP-E1/T1 to the E1/T1 devices using standard straight E1/T1 cables.

2. Configuring MiTOP-E1/T1

Configure MiTOP-E1/T1 to the desired operation mode, using a Web-based management application. The device is accessed via its LAN port.

Configuring E1 and T1 at the Physical Level

E1 and T1 interfaces must be configured at the physical level first.

➤ To configure E1 and T1 at the physical level:

1. From the TDM Interface Type menu (Configuration › Physical Ports, select the TDM interface type, E1 or T1.
2. From the TDM Configuration menu (Configuration › Physical Port › E1 or T1), configure the necessary parameters of the E1 or T1 services.

Defining a Pseudowire Peer

Configure a peer device which communicates with MiTOP-E1/T1 over a PW connection.

➤ To define the pseudowire peer:

- From the Peer menu (Configuration › Applications › Multiservice over PSN › Peer), define the IP and MAC addresses of the peer device.

Configuring a Pseudowire Connection

The E1/T1 traffic is encapsulated into a CESoPSN or SAToP PW and sent over MPLS, UDP/IPv4 or Ethernet (MEF) networks.

➤ To configure a pseudowire connection:

1. From the General Parameters menu (Configuration › Applications › Multiservice over PSN › PW › General Parameters), set the source IP, PW type, PSN type, In and Out PW labels.
2. From the PSN Parameters menu (Configuration › Applications › Multiservice over PSN › PW › PSN Parameters), configure the PSN parameters.
3. From the Service Parameters menu (Configuration › Applications › Multiservice over PSN › PW › Service Parameters), configure the payload size and jitter buffer size for the PW.
4. From the PW menu (Configuration › Applications › Multiservice over PSN › PW), enable the PW connection.

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Chapter 1

Introduction

1.1 Overview

MiTOP-E1/T1 is a TDM pseudowire access gateway extending TDM-based services over packet-switched networks.

Housed in a Small Form-Factor Pluggable (SFP) enclosure, it is designed for quick and simple insertion into any 100BaseFx Ethernet device port with an MSA-compatible compatible socket.

MiTOP-E1/T1 is a simple and cost-effective alternative to external, standalone gateways or conversion cards for each user device, saving on space, power consumption, cabling, and simplifying management.

Application

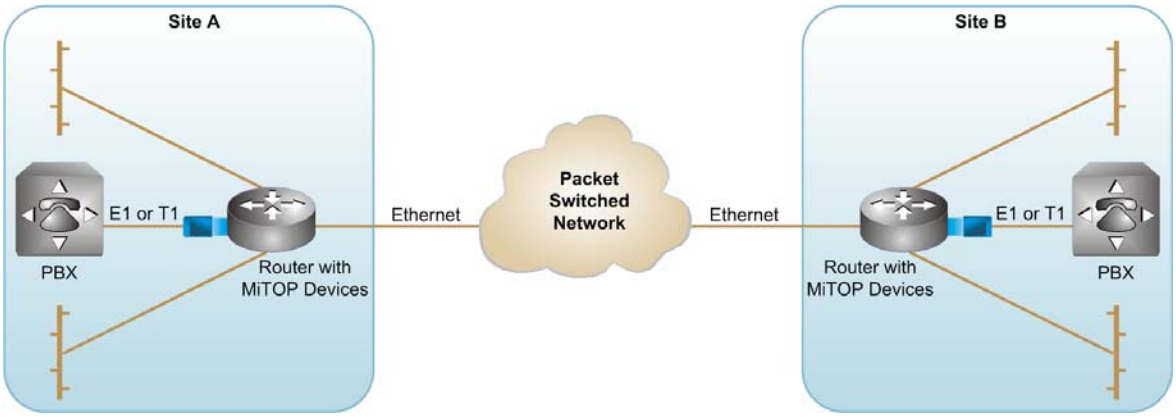


Figure 1-1. Delivering E1/T1 Services over a PSN

Features

- Conversion of the framed and unframed E1/T1 services to Fast Ethernet and vice versa
- Hot-insertion SFP footprint, MSA-compliant hot-swappable
- CESoPSN and SAToP payload encapsulation
- MPLS, MEF 8 and UDP/IP network encapsulation
- One bundle per module
- Three clock modes:
  - Internal
  - Loopback
  - Adaptive
- Full duplex wire-speed packet forwarding
- Management via I^2C and Web browser
- Product identification support
- Easy release mechanism.

1.2 Physical Description

MiTOP-E1/T1 is an SFP device that is inserted into an SFP MSA compatible receptacle in a host unit.

Figure 1-2. MiTOP-E1/T1 3D View

The dimensions of MiTOP-E1/T1 are illustrated in *Figure 1-3*.

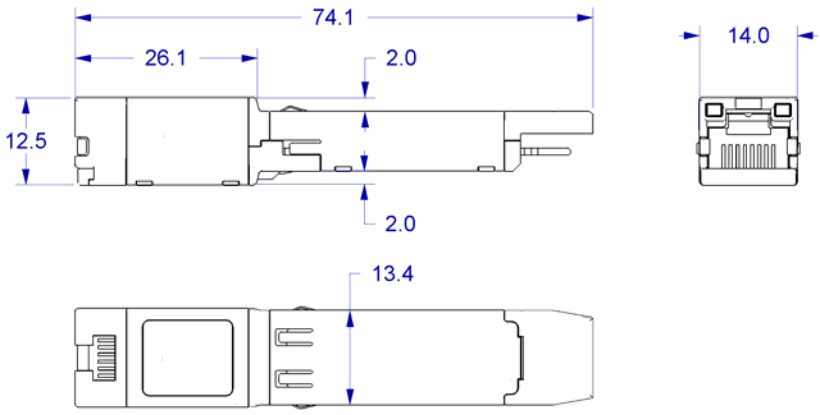


Figure 1-3. MiTOP-E1/T1 Dimensions

1.3 Functional Description

MiTOP-E1/T1 provides TDM connectivity across the Ethernet, MPLS or IP network. A single bundle (group of timeslots) can be transmitted in a TDM pseudowire (PW) to a predefined far-end bundle.

MiTOP-E1/T1 includes a single E1/T1 TDM port. Traffic is transmitted over the network, using the CESoPSN or SAToP encapsulation method.

TDM Service Type

MiTOP-E1/T1 TDM interface operates in unframed mode, the incoming bit stream from each channel (regardless of framing) is converted into IP over Ethernet frames. This provides clear channel end-to-end service (unframed).

Payload Encapsulation

MiTOP-E1/T1 supports the following payload encapsulation techniques: CESoPSN and SAToP.

CESoPSN

The CESoPSN (Circuit Emulation Service over PSN) is a structure-aware format for framed E1/T1 services. It converts structured E1/T1 data flows into MEF, IP or MPLS packets and vice versa with static assignment of timeslots inside a bundle according to ITU-T Y.1413 and IETF RFC 5086. The CESoPSN packet size is a multiple of TDM frame size.

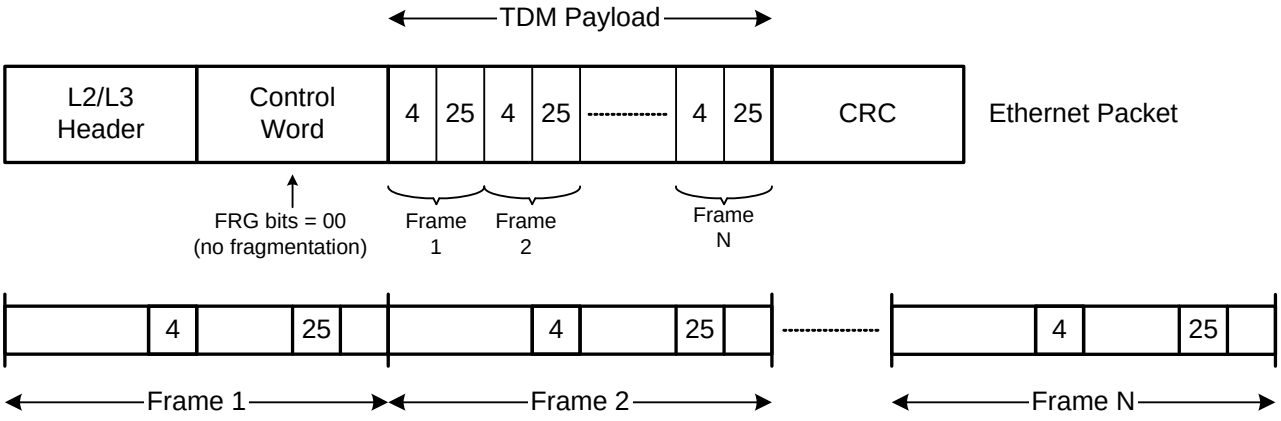


Figure 1-4. CESoPSN Encapsulation (E1, Bundle with Timeslots 4 and 25)

SAToP

The SAToP (Structure Agnostic TDM over Packet) encapsulation method is used to convert unframed E1/T1 data flows into IP or MPLS packets and vice versa according to ITU-T Y.1413 and IETF RFC 4553. It provides flexible packet size configuration and low end-to-end delay.

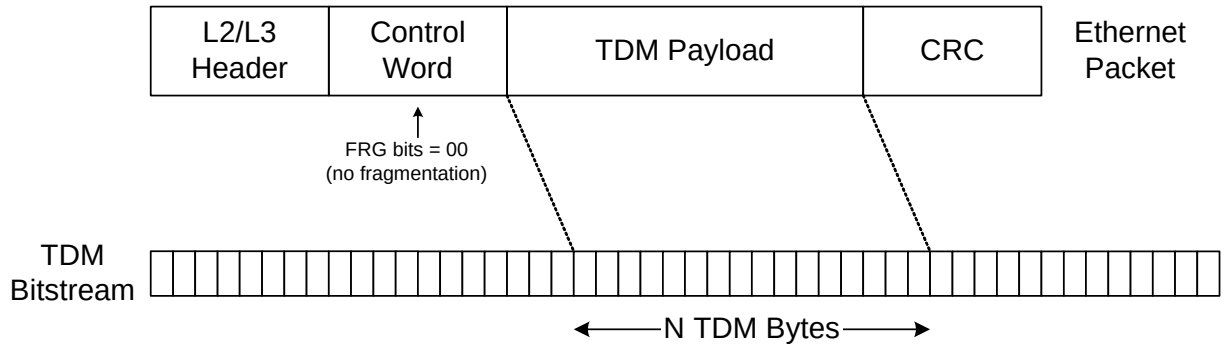


Figure 1-5. SAToP Encapsulation

Packet Delay Variation

TDMoIP packets are transmitted by MiTOP-E1/T1 at a constant rate towards the PSN (Packet-Switched Network). Packet Delay Variation is the maximum deviation from the nominal time the packets are expected to arrive at the far end device. MiTOP-E1/T1 has a jitter buffer that compensates for the deviation from the expected packet arrival time to ensure that the TDM traffic is sent to the TDM device at a constant rate.

The jitter buffer needs to be configured to compensate for the jitter level introduced by the PSN. If the PSN jitter level exceeds the configured jitter buffer size, underflow/overflow conditions occur, resulting in errors at the TDM side.

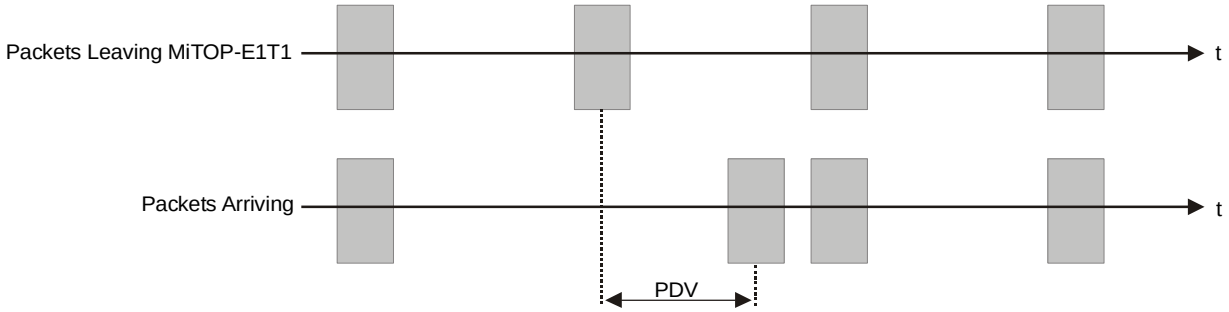


Figure 1-6. Packet Delay Variation

PDVT (Jitter) Buffer

MiTOP-E1/T1 is equipped with a Packet DVT (Delay Variation Tolerance) buffer. The PDVT buffer or jitter buffer is filled by the incoming packets and emptied out to fill the TDM stream.

- A jitter buffer overrun usually occurs when MiTOP-E1/T1 loses its clock synchronization
- A jitter buffer underrun occurs when no packets are received for more than the configured jitter buffer size, or immediately after an overrun.

When the first packet is received, or immediately after an underrun, the buffer is automatically filled with conditioning pattern up to the PDVT level in order to compensate for the underrun. Then MiTOP-E1/T1 processes the packet (packetization delay) and starts to empty out the jitter buffer to the TDM side. See *Figure 1-7* for the illustration of the PDVT buffer operation.

The PDVT (jitter) buffer is designed to compensate for a network delay variation of up to:

- 256 ms (E1, framed T1)
- 340 ms (unframed T1).

Packets arriving from the PSN side are stored in the jitter buffer before being transmitted to the TDM side, adding a delay to the TDM traffic. The delay time is equal to the jitter buffer size configured by the user.

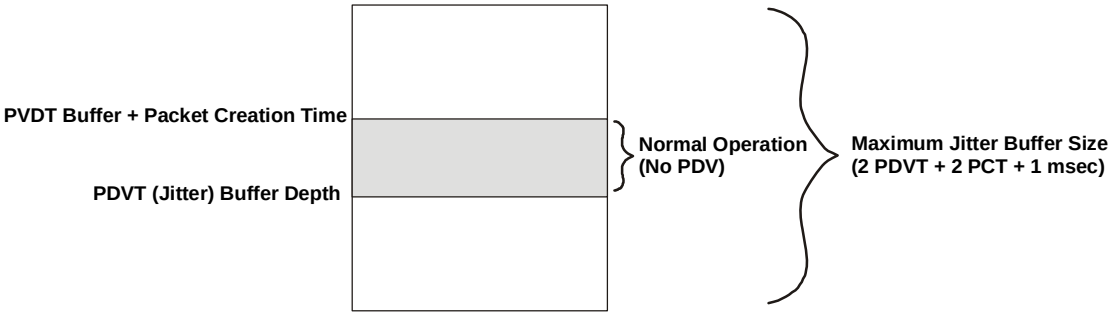

PVDT Buffer + Packet Creation Time
PDVT (Jitter) Buffer Depth
Normal Operation
(No PDV)
Maximum Jitter Buffer Size
(2 PDVT + 2 PCT + 1 msec)

Figure 1-7. Jitter Buffer Operation

Packet Creation Time (PCT)

When MiTOP-E1/T1 builds a frame, a packetization delay is introduced. The packet creation time is different for the different payload encapsulation methods. It is calculated according to the following formulas:

CESoPSN

PCT (ms) = N × 0.125

Where:

N = Number of TDM frames in packet

SAToP

$$\text{PCT (ms)} = \frac{N \times 0.125}{TS}$$

N – Number of TDM bytes in packet

TS – Number of timeslots in one frame (32 for E1 or 24 for T1)

Round Trip Delay

The voice path round-trip delay is a function of all connections and network parameters.

(±2 msec) RT $\text{Delay}_{(msec)}$ = 2 × (PCT + Jitter Buffer Level) + network round trip delay

Ethernet Throughput

Increasing payload size reduces the ratio between the TDMoIP/IP/Ethernet header segment in the packet and the payload, thus reducing the total Ethernet throughput.

On the other hand, packetization delay is increased; this contributes to a higher end-to-end delay. This effect can be small and negligible when a full E1 (or many timeslots) are transferred, but can be very significant when few timeslots are transferred.

Configuring the TDM bytes per frame (TDM bytes/frame) parameter has an impact on Ethernet throughput (bandwidth or traffic traveling through the Ethernet). This parameter controls the number of TDM bytes encapsulated in one frame. The calculations depend on the payload encapsulation type: CESoPSN or SAToP.

- CESoPSN: The TDM frame in packet parameter can be configured to 2–47 (E1), 2–60 (T1)
- SAToP: The bytes in packet parameter can be configured to 30–1476.

➤ **To calculate Ethernet throughput as a function of TDM bytes/frame:**

Ethernet load (bps) = [(frame overhead (bytes) + TDM bytes/frame) × 8] × frames/second

Frame overhead (IP) = Ethernet overhead + IP overhead = 46 bytes

Frame overhead (MPLS) = Control Word + MPLS overhead + Ethernet overhead = 22 bytes

For CESoPSN encapsulation the number of TDM bytes equals to 31 (E1) or 24 (T1).

Note *The frame overhead does not include:*

- *Preamble field: 7 bytes*
- *SFD field: 1 byte*
- *Interframe gap: 12 bytes*
- *VLAN field (when used): 4 bytes.*

Frame/second =

Unframed: 8000 × **k**/**n**

Framed: 8000/ TDM frame

Where **k** = 32 (E1) or 24 (T1)

Where **n** = TDM bytes

The maximum Ethernet throughput is calculated by:

$$(\underbrace{\mathbf{VLAN} + \mathbf{frame\ overhead} + \mathbf{payload}}_{\text{frame size (in bytes)}}) \times 8\ \text{bits} \times \frac{1}{\text{PCT}}$$

Where:

- **VLAN** is an optional field: if enabled it adds 4 bytes to the frame overhead
- **payload** = number of TDM bytes in frame
- **frame overhead** = size of 46 bytes, include MAC, LLC, IP and UDP layer

The result is in bits per second (bps).

Timing Modes

Synchronization between TDM devices is maintained by deploying advanced clock distribution mechanisms. The clocking options are:

- Loopback timing – the E1/T1 Tx clock is derived from the E1/T1 receive (Rx) clock
- Adaptive timing – the E1/T1 Tx clock is regenerated from the network packet flow. Jitter and wander of the recovered clock are maintained at levels that conform to G.823/G.824 traffic or synchronization interfaces.
- Internal timing – the Tx clock is derived from an internal oscillator.

Note *In adaptive timing, the regenerated clock is subject to network packet delay variation. That is why the quality of the adaptive clock depends on the quality of the network.*

Management

MiTOP-E1/T1 is managed using the following methods:

- Out-of-band, from a management station, connected directly to the product, using the I2C protocol.
- Inband via the Ethernet port, using a Web browser. Web-based terminal management system is used for remote device configuration and maintenance. It is embedded into MiTOP-E1/T1 and provided at no extra cost. The management application can be run from any standard Web browser.

Fault Propagation

E1 or T1 loss of signal is propagated by sending an electrical LOS signal to the 100BaseFx port, and is visually indicated by the LOS LED (red). This in turn automatically turns off the LAN link. Fault propagation can be enabled or disabled.

Diagnostics

External and internal loopbacks can be used to check TDM link connectivity.

Alarms detected during operation are stored in a buffer holding up to 100 events.

Configuration Adapter

An optional configuration adapter is available for connecting MiTOP-E1/T1 to a PC via a USB 2.0 port.

The configuration adapter is used for the preliminary configuration of the gateways or software download to the units.

1.4 Technical Specifications

E1 Interface

Number of Ports	1
Compliance	G.703, G.704, G.823
Data Rate	2.048 Mbps
Line Code	HDB3. AMI
Jitter and Wander Performance	Per ITU-T G.823
Framing	Framed, unframed
Line Impedance	120Ω, balanced
Cable Type	UTP CAT-5
Cable Length (max over 22 AWG wire)	Short haul: 770m (2530 ft) Long haul: 2664m (8740 ft)
Connector	RJ-45

T1 Interface

Number of Ports	1
Compliance	G.824, T1.403, G.703, G.823, T1-231, AT&T TR-62411
Data Rate	1.544 Mbps
Line Code	B8ZS, AMI
Jitter and Wander Performance	Per AT&T TR-62411, ITU-T G.823, G.824
Framing	Framed, unframed
Line Impedance	100Ω, balanced
Cable Type	UTP CAT-5
Cable Length (max over 22 AWG wire)	Short haul: 1192m (3910 ft) Long haul: 2874m (9430 ft)
Connector	RJ-45

Ethernet Interface

Type	100BaseFx

	Compliance	IEEE 802.3
	Edge Connector	SFP-based, MSA-compliant
Pseudowire Connections	*Standard Compliance*	CESoPSN: IETF RFC 5086 SAToP: IETF RFC 4553 MEF: MEF 8
	Number of PW Connections	1
	Jitter Buffer Depth	E1, framed T1: up to 256 ms Unframed T1: up to 340 ms
General	*LED Indicators*	LINK (green) – Ethernet link status LOS (red) – E1/T1 signal status
	Transmit Clock	Internal, loopback, adaptive or external
	Power	3.3V, up to 330 mA
	Power Consumption	1.1W
	Dimensions	Height: 12.5 mm (0.49 in) Width: 14.0 mm (0.55 in) Depth: 74.1 mm (2.91 in) Weight: 30.0 g (1.0 oz)
	Environment	Temperature: -40 to 65°C (-40 to 149°F) Humidity: Up to 90% non-condensing

Chapter 2
Installation and Setup

2.1 Introduction

Housed in a Small Form Factor Pluggable (SFP) package, MiTOP-E1/T1 complies with the Multi-Source Agreement (MSA) and can be inserted into any MSA compatible host unit.

MiTOP-E1/T1 is an autonomous plug-and-play hot-insertion module. You may configure a MiTOP-E1/T1 unit while it is plugged into the host device or by using RAD's SFP-CA configuration adapter illustrated in *Figure 2-2*.

MiTOP-E1/T1 is equipped with DIP switches on the underside that allow setting the MiTOP-E1/T1 unit to various operation modes. Operation modes depend on the desired task and are listed below together with the associated DIP switch settings.

In addition, MiTOP-E1/T1 can be managed via an I^2C interface (out-of-band) and/or a Web-based management interface. For additional information, refer to *Chapter 4*.

2.2 Site Requirements and Prerequisites

The ambient operating temperature should be –40°C to 70°C (–40°F to 158°F), at a relative humidity of up to 90%, non-condensing.

2.3 Package Contents

The product package includes up to four MiTOP-E1/T1 units.

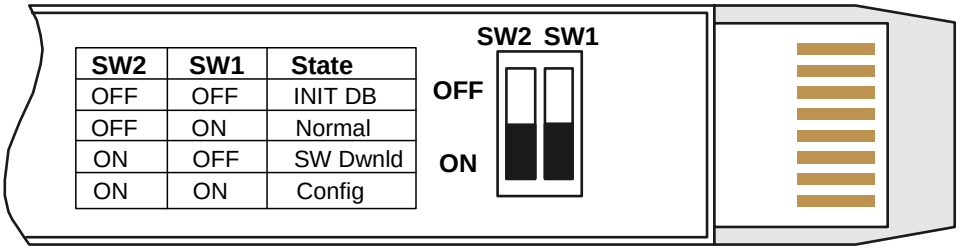
2.4 Setting the Switches

MiTOP-E1/T1 includes a 2-section DIP switch which is used for selecting one of the following operation modes of the device:

- Database initialization
- Normal operation
- Software download
- Configuration.

➤ **To select the working mode:**

- On MiTOP-E1/T1's underside, set the DIP switches as listed in *Table 2-1* to enable the desired working mode.



SW2	SW1	State
OFF	OFF	INIT DB
OFF	ON	Normal
ON	OFF	SW Dwnld
ON	ON	Config

Figure 2-1. DIP Switch Location

Table 2-1. DIP Switch Settings

Switch Position		Function
SW2	SW1	
OFF	OFF	Database initialization
OFF	ON	Normal operation (factory setting)
ON	OFF	Software upgrade
ON	ON	Configuration

2.5 Connecting MiTOP-E1/T1 to the SFP-CA

For first use, you have to assign an IP address to MiTOP-E1/T1 and specify a mode of operation. To do so, you can use RAD's SFP-CA module illustrated in *Figure 2-2*. You can also use this module to upgrade the MiTOP-E1/T1's software.

➤ **To connect MiTOP-E1/T1 to the SFP-CA unit:**

1. Connect power to the SFP-CA unit.
2. Plug the USB connector of SFP-CA into a USB 2.0 port of a PC.
3. Plug MiTOP-E1/T1 into the SFP socket on the opposite side on the SFP-CA unit.

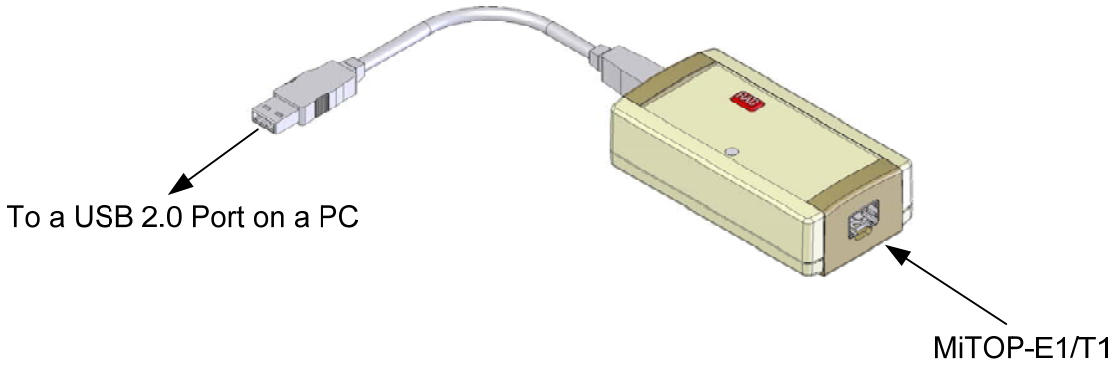


Figure 2-2. SFP-CA Configuration Unit

➤ **To eject MiTOP-E1/T1 from SFP-CA:**

1. Close all relevant management applications.
2. Push the release button at the front of MiTOP-E1/T1 to disconnect it from SFP-CA.
3. Remove MiTOP-E1/T1 from the SFP socket on SFP-CA.

2.6 Installing MiTOP-E1/T1 in the Host Unit

Note

You do not have to switch off the host unit when inserting or extracting MiTOP-E1/T1.

➤ **To insert MiTOP-E1/T1:**

1. Configure MiTOP-E1/T1 to the normal operation mode.
2. Insert MiTOP-E1/T1 into a free SFP (MSA-compatible) socket of the host equipment.
3. Press MiTOP-E1/T1 firmly into the MSA SFP port connector.

   MiTOP-E1/T1 is ready to operate.

➤ **To eject MiTOP-E1/T1:**

1. Disconnect cables attached to MiTOP-E1/T1.
2. Push the release button at the front of MiTOP-E1/T1 to extract it from the edge connector.
3. Remove MiTOP-E1/T1 from the socket.

2.7 Connecting to the E1/T1 Devices

E1/T1 devices are connected to MiTOP-E1/T1 via the balanced RJ-45 port (see *Appendix A* for the connector pinout.

➤ **To connect to the E1/T1 devices with balanced interfaces:**

- Connect MiTOP-E1/T1 to the E1/T1 devices using standard straight E1/T1 cables.

Chapter 3

Operation

This chapter:

- Provides a detailed description of the MiTOP-E1/T1 LED indicators and their functions
- Lists alternative methods of the product configuration, explaining I^2C and Web browser management applications and illustrating management menus.

  For a detailed explanation of parameters on the menus, see *Chapter 4*.

3.1 LED Indicators

The LINK and LOS LEDs are located on the E1/T1 RJ-45 connector. *Table 3-1* describes the LED functions.

Table 3-1. LED Indications

LED	Function
LINK (green)	Blinking – Ethernet link is connected and the data is being transferred OFF – Ethernet link is disconnected
LOS (red)	ON – No E1/T1 signal detected OFF – Valid E1/T1 signal detected
LOS at power-up	Blinking three times – MiTOP-E1/T1 is in NORMAL or CONFIGURATION mode Continuously blinking – MiTOP-E1/T1 is in INIT DB mode OFF – MiTOP-E1/T1 is in SW DOWNLOAD mode

3.2 Default Settings

Table 3-2 lists the default settings of the MiTOP-E1/T1 configuration parameters provided via the Web-based management application.

Table 3-2. Default Settings

Type	Parameter	Default Value
System		
Clock Recovery	Fault Propagation WTR	0
	Source Quality	Stratum1
	Clock Mode	Auto

Type	Parameter	Default Value
Fault Propagation		Disable
	Caused by:	
	LOS	Disable
	RDI	Disable
	AIS	Disable
	Fault Propagation WTR	0
Tx Disable Behavior		Not Available
LOS Behavior	LOS caused by:	
	LOS	Disable
	RDI	Disable
	AIS	Disable
Management		
Device Info	Device Name	MiTOP-E1/T1
	Location	–
	Contact Person	–
Host IP	IP Address	192.168.205.1
	IP Mask	255.255.255.0
	Default Gateway	0.0.0.0
	Host Tagging	Untagged
	Host VLAN ID	1
	Host VLAN Priority	0
Management Access	LAN (Web)	Enable
Outband	Outband Mode	Normal
	Outband Address	128
Physical Ports	Interface Type	E1
E1	TX Clock Source	Internal Clock
	Line Code	HDB3
	RX Sensitivity	Long Haul
	Line Type	E1 G.732N CRC
T1	TX Clock Source	Internal Clock
	Line Code	B8ZS
	RX Sensitivity	Long Haul
	Line Type	Unframed
	Line Length	DSU: 0–133 ft

Type	Parameter	Default Value
Applications		
Peer	Peer Number	1
	Peer Name	Peer Name 1
	Peer IP Address	00.00.00.00
	Next Hop	00.00.00.00
	Peer MAC Address	00 00 00 00 00 00
PW	PW Name	PW Name 1
	Connection Status	Enable
	Discarded by	15
General Parameters	Source IP	0.0.0.0
	PW Type	CESoPSN
	PSN Type	UDP/IPv4
	Peer Number	1
	Owner	Manually
	OAM	Enable
	Unreachable Detection	Disable
	Multiplexing	Source
	Out PW Label	16
	In PW Label	16
PSN Parameters	PW Reordering	Enable
	TOS	0
	VLAN Tagging	Disable
	VLAN Priority	0
	VLAN ID	1
	Ingress Label	16
	Egress Label	16
	EXP Bits	0
	TTL	0
Service Parameters	Payload Size	4 (CESoPSN), 128 (SAToP)
	Jitter Buffer	1500 (CESoPSN), 500 (SAToP)

Type	Parameter	Default Value
Diagnostics	Loopback State	Disable
	Loop Timeout	0
	TRDI	Disable
	TAIS	Disable

3.3 Configuration Alternatives

If required, MiTOP-E1/T1 can be reconfigured, using different ports and applications:

- Local out-of-band management via an I^2C interface
- Local or remote inband management via a Fast Ethernet port, using RAD's Web-based application.

Working with the I^2C Interface

MiTOP-E1/T1 allows monitoring a current status and performing diagnostics via the SFP edge connector's I^2C interface. Refer to *Appendix C* for instructions and the required message format.

Working with the Web Browser

You can locally or remotely configure and manage MiTOP-E1/T1 using a Web-based management interface. *Chapter 4* illustrates menus and explains configuration parameters.

Web Browser Requirements

The following Web browsers can be used to access the MiTOP-E1/T1 supervision utility from any location that enables access to the MiTOP-E1/T1 using Internet protocols.

- Internet Explorer 6.0 and up, running on Windows™
- Netscape Communicator 7.0 and up, running on Windows™, HPOV or Linux
- Firefox 1.0.4 and up, running on Windows™
- Mozilla 1.4.3 and up, running on Linux.

However, before using Web access, it is necessary to perform a preliminary configuration of MiTOP-E1/T1.

When using a Web browser, pay attention to the following points:

- Enable scripts
- Configure the firewall that is probably installed on your PC in order to allow access to the destination IP address

- Disable pop-up blocking software (such as Google Popup Blocker); you may also have to configure your spyware/adware protection program to accept traffic from/to the destination IP address
- Browsers store the last viewed pages in a special cache. To prevent configuration errors, it is absolutely necessary to flush the browser's cache whenever you return to the same screen.

Access Levels

To prevent unauthorized modification of the operating parameters, MiTOP-E1/T1 supports two access levels:

- Superuser (su) can perform all the activities supported by the MiTOP-E1/T1 management facility, including defining new users.
- User (user) has read-only access rights only.

➤ **To enter as a superuser:**

1. Enter **su** for user name.
2. Enter **1234** for password.

   This allows you to configure all MiTOP-E1/T1 parameters.

➤ **To enter as a user:**

1. Enter **user** for user name.
2. Enter **1234** for password.

   This allows you to view the MiTOP-E1/T1 parameters.

Configuring MiTOP-E1/T1 for First Use

Before accessing MiTOP-E1/T1 from the network, connect it to the SFP-CA configuration module, install the SFP-CA driver and assign an IP address to MiTOP-E1/T1 that complies with your network requirements.

Note

- *You can use MiTOP-E1/T1's default IP address (192.168.205.1) for initial configuration.*
- *Reliable communication link between MiTOP-E1/T1 and SFP-CA is possible only when the MiTOP-E1/T1 OAM parameter (Configuration › Applications › Multiservice over PSN › PW › General Parameters) is set to Enable.*

Configure the relevant network parameters of your PC to establish a proper communication link with MiTOP-E1/T1 as explained below.

➤ **To install the SFP-CA driver on a PC:**

1. Make sure that the relevant PC is running MS Windows XP SP2.
2. Insert the Technical Documentation CD into the CD drive of the PC.

   The CD main menu appears.

3. Click the link to the System on an SFP Family page.

   The System on an SFP Family page appears, with an entry for the SFP-CA documentation and driver.

4. Click the SFP-CA driver link.

   The SFP-CA driver installs in the background. No further action is required.

➤ **To configure the PC for the SFP-CA connection to MiTOP-E1/T1:**

1. Connect the SFP-CA configuration unit to a USB port on your PC (see *Chapter 2*).

   New Hardware is Detected notice is displayed.

2. Right-click **My Network Places**.

   A new network connection appears listed.

3. Right-click the new local area connection and rename it to **SFP-CA**.

4. Right-click **Properties**, click **Configure**, select the **Advanced** tab.

   The Network Connection Properties window appears.

5. Choose **Select Media** and under **Value**, choose **Home LAN**, and then click **OK**.

6. Right-click the SFP-CA connection and click **Properties**.

   The Local Area Connection Properties window appears.

7. Select Internet Protocol (TCP/IP) and click **Properties**.

   The Internet Protocol (TCP/IP) window appears.

8. To enable entering TCP/IP settings, select **Use the following IP Address**.

   The IP Address, the Subnet Mask and the Default Gateway field become available.

9. Enter the following TCP/IP settings and then click **OK**:

   - **IP Address:** 192.168.205.20
   - **Subnet Mask:** 255.255.255.0
   - **Default Gateway:** 192.168.205.1

10. Close **My Network Places**.

    The PC is ready to connect the SFP-CA configuration unit with MiTOP-E1/T1.

➤ **To assign a new IP address to MiTOP-E1/T1:**

1. Set MiTOP-E1/T1 to the Configuration mode, using its DIP switches (see *Chapter 2*).

Note *Setting a different working mode via the DIP switches requires disconnecting MiTOP-E1/T1 from any device (SFP-CA or host).*

2. Plug MiTOP-E1/T1 into the SFP socket of SFP-CA configuration unit.

3. Connect SFP-CA to your PC via USB port.

   The Ready LED on SFP-CA turns on.

4. Open the Web browser and enter http://192.168.205.1 into the Web browser's address field.

   The Opening screen appears.

5. Click **Login**.

   The Login screen appears.

6. Enter the default user name **su** and the default password **1234** for Super User access, and then click **Submit**.

   A menu appears to the left and you are able to configure MiTOP-E1/T1.

7. From the Host IP menu (Configuration › System › Management › Host IP), enter the new IP address, the IP mask and the default gateway values.

8. Save the changes.

   The new TCP/IP settings are assigned. You may continue specifying additional parameters or connect to MiTOP-E1/T1 from any PC on your network at a later stage, using the newly assigned IP address.

Navigating the Web-Based Management Menus

The MiTOP-E1/T1 Web-based remote access management software provides a user-friendly interface for configuring, collecting statistics and performing diagnostic tests on the MiTOP-E1/T1 units.

➤ **To choose an option:**

1. Click a link in the Web configuration utility screen to display the next menu.
2. Once the target screen is displayed, select a value from the drop-down box or enter it in a text box.

Menu Map

Use these menu trees as a reference aid while performing configuration and control functions. *Chapter 4* illustrates menus and explains parameters. *Table 3-2* lists default values.

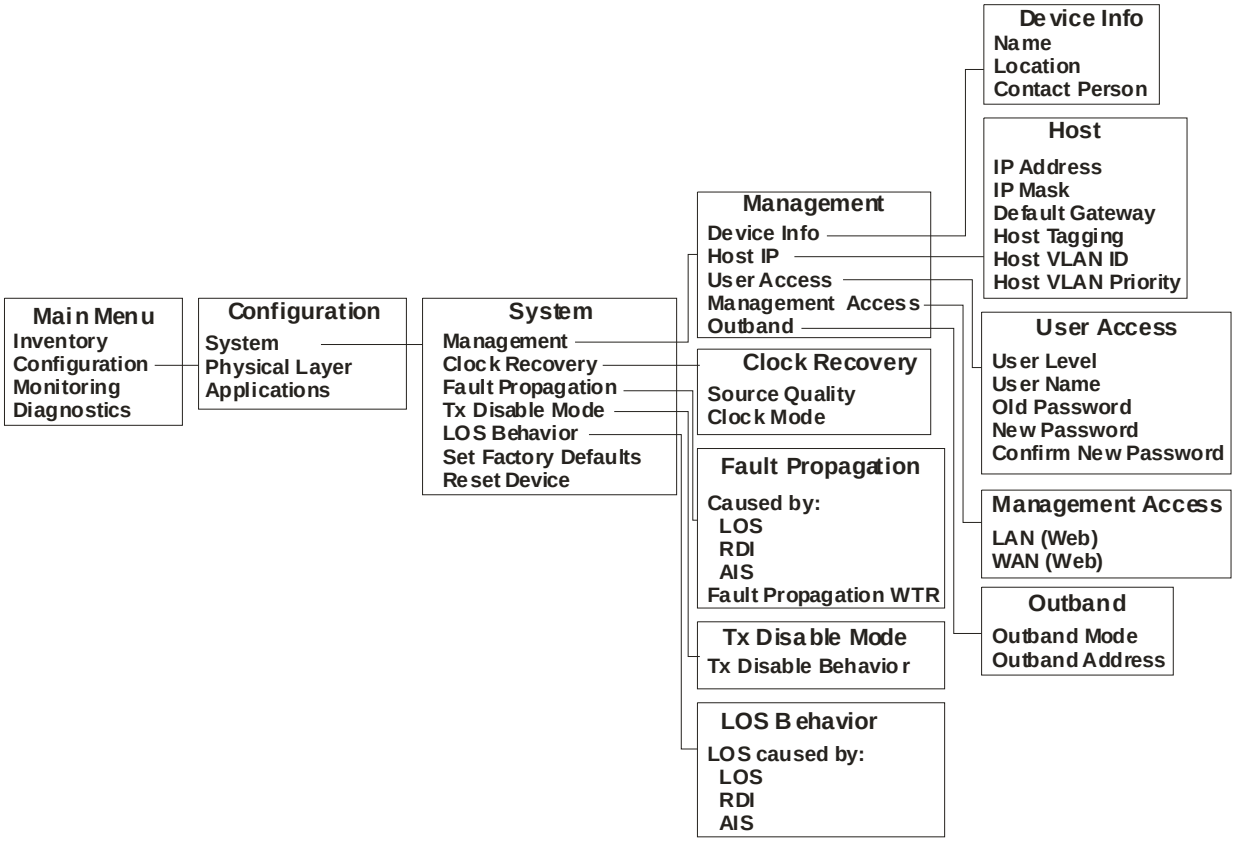


Figure 3-1. Main Menu › Configuration › System

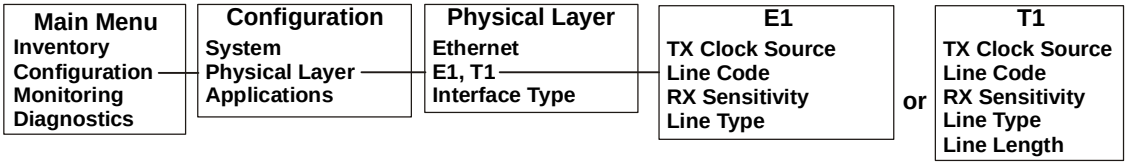


Figure 3-2. Main Menu › Configuration › Physical Layer

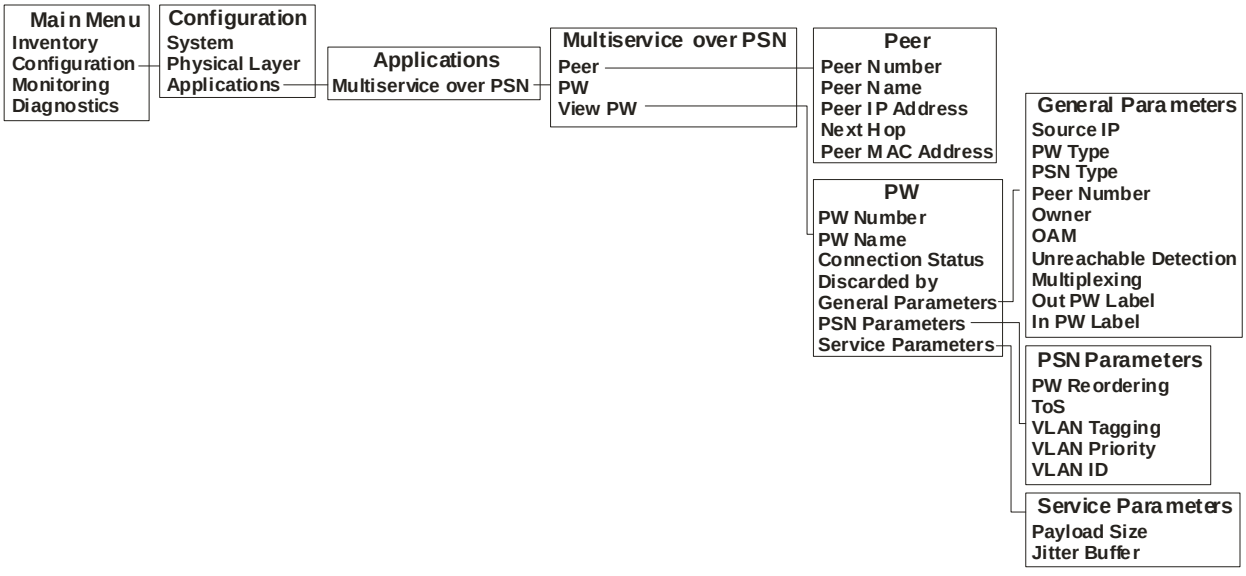


Figure 3-3. Main Menu › Configuration › Applications

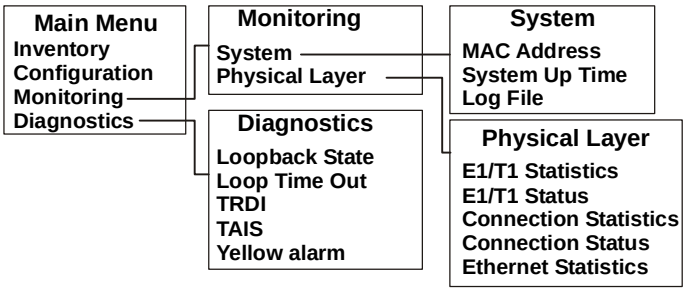


Figure 3-4. Main Menu › Monitoring and Diagnostics

Chapter 4

Configuration

This chapter illustrates the configuration MiTOP-E1/T1 screens and explains their parameters.

The menu tree of the MiTOP-E1/T1 management software is shown in *Chapter 3*.

4.1 Configuring MiTOP-E1/T1 for Management

Before configuring MiTOP-E1/T1 make sure to assign a new IP address, an IP mask and a default gateway value to the unit's host, as explained in *Chapter 3*. Once the MiTOP-E1/T1 host IP parameters are set, perform the following steps in order to configure MiTOP-E1/T1 for management:

- *Entering Device Information*
- *Configuring the Host IP Parameters*
- *Defining Management Access Permissions*
- *Controlling Management Access*
- *Enabling/Disabling I2C Cycle Stretching.*

Entering Device Information

The MiTOP-E1/T1 management software allows you to assign a name to the unit, add its description, specify its location to distinguish it from the other devices installed in your system, and assign a contact person.

➤ **To enter device information:**

1. From the Device Info menu (Configuration › System › Management › Device Info), select **Device Name** and enter a desired name for the MiTOP-E1/T1 unit.
2. In the **Device Location** field, enter the desired name for the current MiTOP-E1/T1 location.
3. In the **Contact Person** field, enter the name of a contact person.

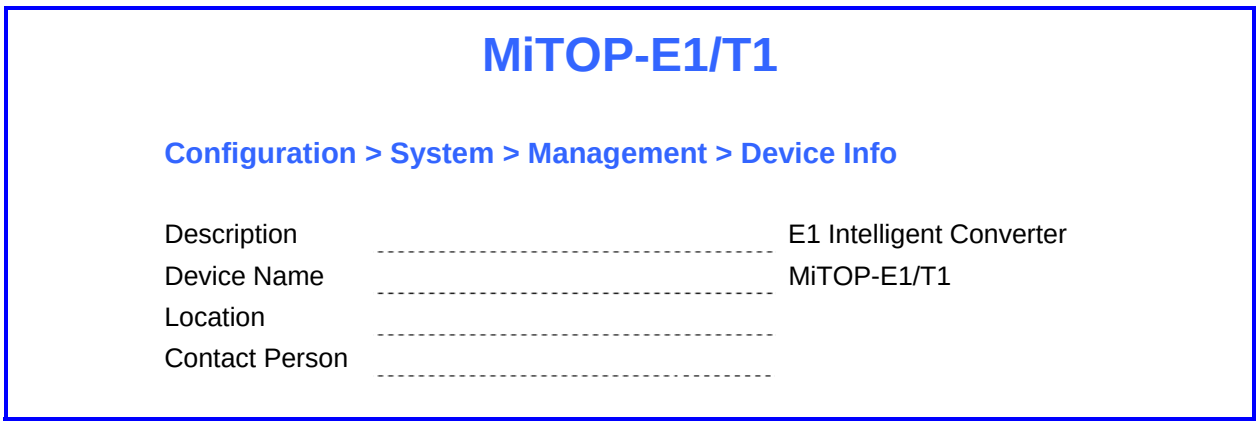


Figure 4-1. Device Info Menu

Configuring the Host IP Parameters

In addition to defining the IP parameters of the MiTOP-E1/T1 host (see *Chapter 3*), the management software allows you to create a dedicated management VLAN in order to separate management traffic from the user data.

➤ **To configure the host IP parameters:**

- From the Host IP menu (Configuration › System › Management › Host IP), do the following:
  - In the **IP Address** field, enter the host IP address
  - In the **IP Mask** field, enter the host IP mask.
  - In the **Default Gateway** field, set the default gateway IP address.
  - Set **Host tagging** to be **Tagged** or **Untagged** to consider or ignore the VLAN tagging of the management traffic coming from the management station.
  - If host tagging is enabled, enter:
    - **Host VLAN ID** (ID of the host VLAN): **1–4094**
    - **Host VLAN Priority** (Priority of the host VLAN): **0–7**

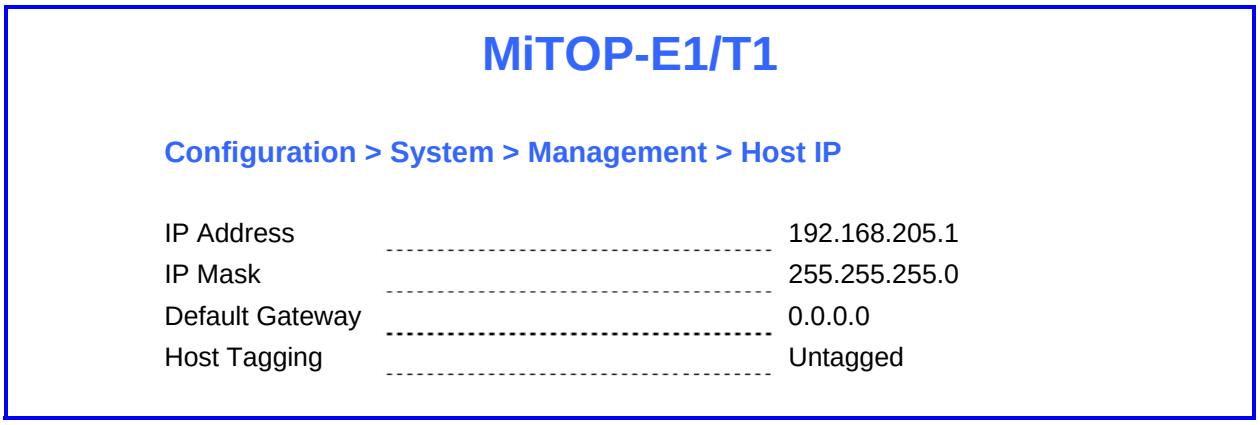


Figure 4-2. Host IP Menu

Defining Management Access Permissions

MiTOP-E1/T1 management software allows you to define new users, their management and access rights. Only superusers (su) can create new users and change credentials of existing users.

➤ **To add a new user:**

1. Make sure that you are logged in as **su**.
2. From the User Access menu, do the following:
   - Click **Forward** to select a user level: Super User or User.
   - In the **User Name** field, enter a name for a new user.
   - In the **Old Password** field, enter a superuser password that was used to log in during the current management session.
   - In the **New Password** field, assign a password to a new user name.
   - In the **Confirm New Password** field, re-enter the new user password to confirm it.

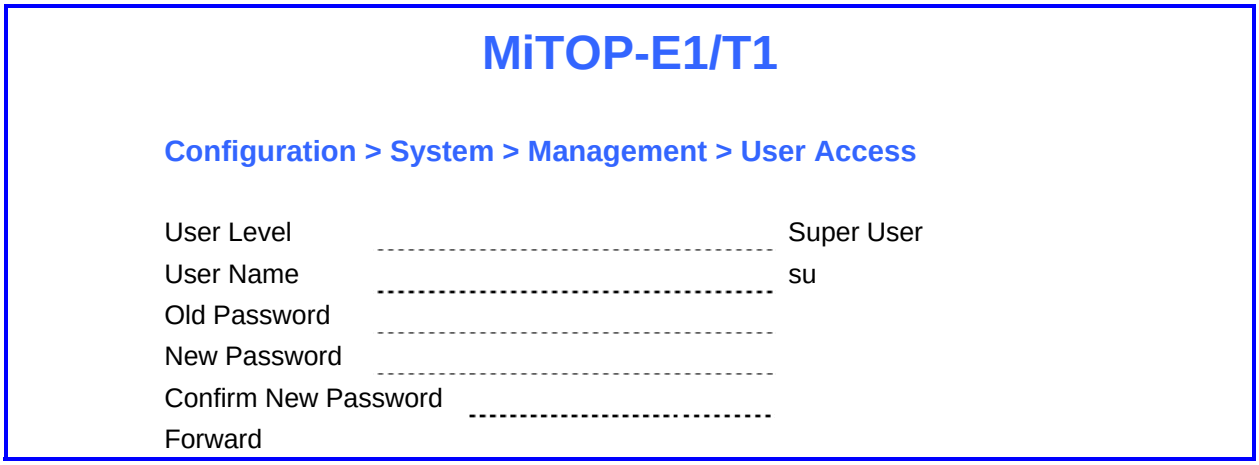


Figure 4-3. User Access Menu

Controlling Management Access

You can enable or disable Web access to MiTOP-E1/T1 via LAN.

➤ **To enable or disable Web access to MiTOP-E1/T1:**

- From the Management Access menu (Configuration › System › Management › Management Access), select LAN (Web) and enable or disable Web access to MiTOP-E1/T1 via its LAN interface.

Figure 4-4. Management Access Menu

Enabling/Disabling I²C Cycle Stretching

MiTOP-E1/T1 can be configured to operate with or without the I²C cycle stretching functionality. Refer to *Appendix C* for additional information.

➤ **To enable or disable I²C cycle stretching:**

- From the Outband menu (Configuration › System › Management › Outband), perform the following:
  - To enable I²C cycle stretching, select **Normal**.
  - To disable I²C cycle stretching, select **Without Stretching**.

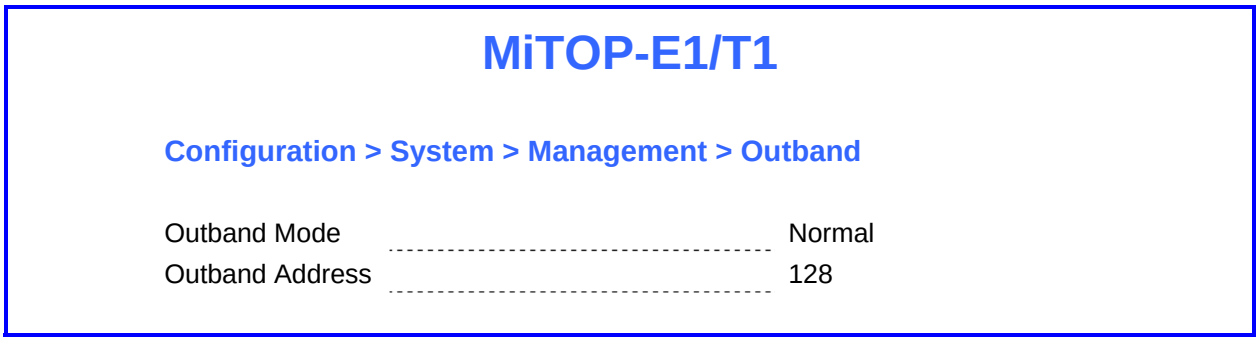


Figure 4-5. Outband Menu

4.2 Configuring MiTOP-E1/T1 for Operation

The recommended configuration procedure for MiTOP-E1/T1 includes the following stages:

1. Configuring device-level parameters
2. Configuring the TDM interfaces at the physical level
3. Configuring the multiservice over PSN application (pseudowire and network parameters).

Configuring the System-Level Parameters

The system-level parameters of MiTOP-E1/T1 include the following:

- Fault propagation
- Tx disable mode
- LOS behavior.

These parameters are configured via the System menu.

Configuring Fault Propagation

The fault propagation mechanism propagates the E1 and T1 link defect conditions to the 100BaseFx port. When the fault propagation is enabled, the Ethernet port is disconnected if one of the following events is detected on the TDM interface:

- Loss of signal (LOS)
- Remote defect indication (RDI)
- Alarm indication signal (AIS).

Alternatively, you can disable propagation of any of the supported conditions to the Ethernet port.

You can also specify the wait-to-restore (WTR) time (the time period MiTOP-E1/T1 waits before reconnecting an interface once the failed interface is restored).

➤ **To configure fault propagation:**

1. From the System menu (Configuration > System), enable or disable fault propagation.
2. When fault propagation is enabled, select Fault Propagation to display the relevant menu and configure the following parameters:
   - LOS:
     - Enable (LOS on the TDM link is propagated to the Ethernet interface)
     - Disable (LOS on the TDM link is not propagated to the Ethernet interface)
   - RDI:
     - Enable (RDI on the TDM link is propagated to the Ethernet interface)
     - Disable (RDI on the TDM link is not propagated to the Ethernet interface)
   - AIS:
     - Enable (AIS on the TDM link is propagated to the Ethernet interface)
     - Disable (AIS on the TDM link is not propagated to the Ethernet interface)
   - Fault Propagation WTR (Wait-to-restore time in seconds): 0–3600; 0 disables the WTR.

MiTOP-E1/T1

Configuration > System > Fault Propagation

Fault propagation caused by:

LOS	Disable
RDI	Disable
AIS	Disable
Fault Propagation WTR (sec) [0..3600]	0

Figure 4-6. Fault Propagation Menu

Selecting Tx Disable Mode

MiTOP-E1/T1 lets you configure how the system responds to disabling the Tx connection.

➤ **To configure the Tx Disable Mode**

1. In the System menu (Configuration › System), select **Tx Disable Mode**.

   The Tx Disable Mode screen appears.

Figure 4-7. Tx Disable Behavior Menu

2. Specify how the system responds when the Tx link fails:
   - Not Available (Tx link failure has no impact on MiTOP-E1/T1 and no action is taken)
   - AIS (Alarm indication signal is activated)
   - Tri-State (E1/T1 framer is shut down).

Defining LOS Behavior

MiTOP-E1/T1 allows you to define whether to send the LOS indication to the Ethernet interface when one of the following conditions is detected on the TDM link:

- Loss of signal (LOS)
- Remote defect indication (RDI)
- Alarm indication signal (AIS).

➤ **To configure the LOS behavior:**

1. In the System menu (Configuration › System), select **LOS Behavior**.

   The LOS Behavior menu appears.

Figure 4-8. LOS Behavior Menu

2. Specify MiTOP-E1/T1 LOS behavior.
   - LOS:
     - Enable (LOS on the TDM link is propagated as LOS to the Ethernet interface)
     - Disable (LOS on the TDM link is not propagated as LOS to the Ethernet interface)
   - RDI:
     - Enable (RDI on the TDM link is propagated as LOS to the Ethernet interface)
     - Disable (LOS on the TDM link is not propagated as LOS to the Ethernet interface)
   - AIS:
     - Enable (AIS on the TDM link is propagated as LOS to the Ethernet interface)
     - Disable (AIS on the TDM link is not propagated as LOS to the Ethernet interface)

Note *If the line code is set to **AMI**, the LOS Behavior screen is inactive, although it is accessible and all parameters are displayed.*

Configuring TDM Ports at the Physical Level

MiTOP-E1/T1 has one 100BaseFx and one E1/T1 TDM port. Before defining pseudowire connections, select the TDM port type and configure it at the physical level.

Selecting the TDM Interface Type

Before configuring the MiTOP-E1/T1 TDM interface, it is necessary to select its type (E1 or T1).

➤ **To select the TDM interface type:**

- From the Physical Ports menu (Configuration > Physical Ports), choose the type of the MiTOP-E1/T1 TDM link (E1 or T1).

Figure 4-9. Physical Ports Menu

Configuring the E1 Interface at the Physical Level

➤ **To configure the physical layer of E1 interface:**

- From the E1 menu (Configuration > Physical Ports > E1), configure the following:
  - TX Clock Source (Transmit clock source):
    - Internal (Tx clock is received from an internal oscillator)
    - LBT (E1 recovered Rx clock is used as the Tx clock)
    - Adaptive (Tx timing is provided by the adaptive timing recovery mechanism. This locks the port Tx timing to the average rate of packets received from the PSN through the bundle serving this E1 port.)
  - Line Code (Line coding used by E1 interface)
    - HDB3
    - AMI
  - Rx Sensitivity (Maximum attenuation of the receive signal that can be compensated for by the interface receive path):
    - Short haul (-12 dB)
    - Long haul (-43 dB)
  - Line Type (E1 framing mode):
    - Unframed
    - G.732N (G.732N framing, CRC function is disabled)
    - G.732N CRC (G.732N framing, CRC function is enabled)

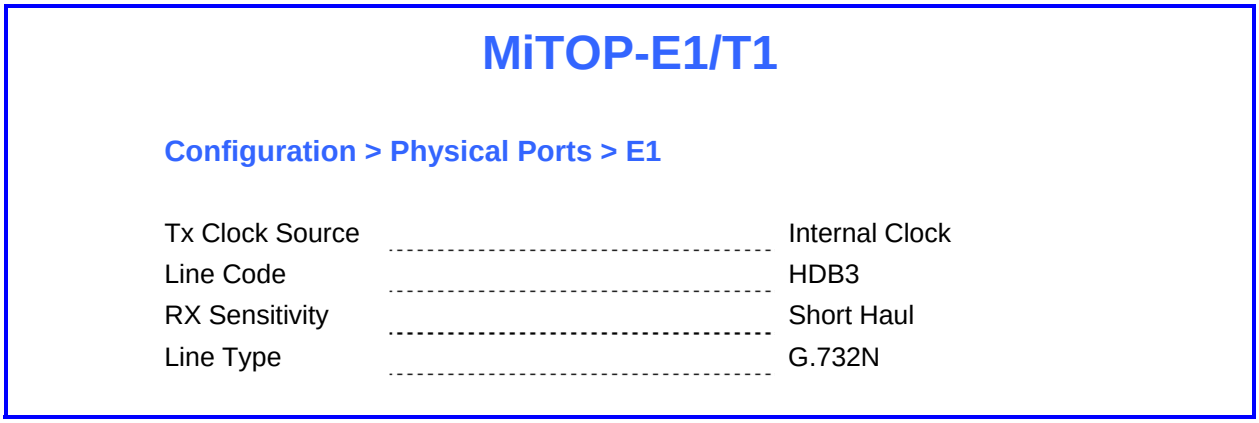


Figure 4-10. E1 Port Physical Layer Menu

Configuring T1 Interface at the Physical Level

➤ **To configure physical layer of T1 interface:**

- From the T1 menu (Configuration > Physical Ports > T1), configure the following:
  - Internal (Tx clock is received from an internal oscillator)

- LBT (T1 recovered Rx clock is used as the Tx clock)
- Adaptive (Tx timing is provided by the adaptive timing recovery mechanism. This locks the port Tx timing to the average rate of packets received from the PSN through the bundle serving this T1 port.)

- Line Code (Line code and zero suppression method used by the port):
  - B8ZS
  - AMI
- Rx Sensitivity (Maximum attenuation of the receive signal that can be compensated for by the interface receive path):
  - Short haul (-15 dB)
  - Long haul (-36 dB)
- Line Type (T1 framing mode):
  - Unframed
  - ESF (24 frames per multiframe)
  - D4 (12 frames per multiframe)
- Line Length (For DSU mode – Length of a cable in feet between the T1 port connector and the network access point; for CSU mode – Tx gain level relative to T1 output transmit level):
  - DSU: 0–133 ft
  - DSU: 133–266 ft
  - DSU: 266–399 ft
  - DSU: 399–533 ft
  - DSU: 533–655 ft
  - CSU: -7.5 dB (Attenuation of 7.5 dB relative to the nominal transmit level)
  - CSU: -15 dB (Attenuation of 15 dB relative to the nominal transmit level)
  - CSU: -22 dB (Attenuation of 22 dB relative to the nominal transmit level)

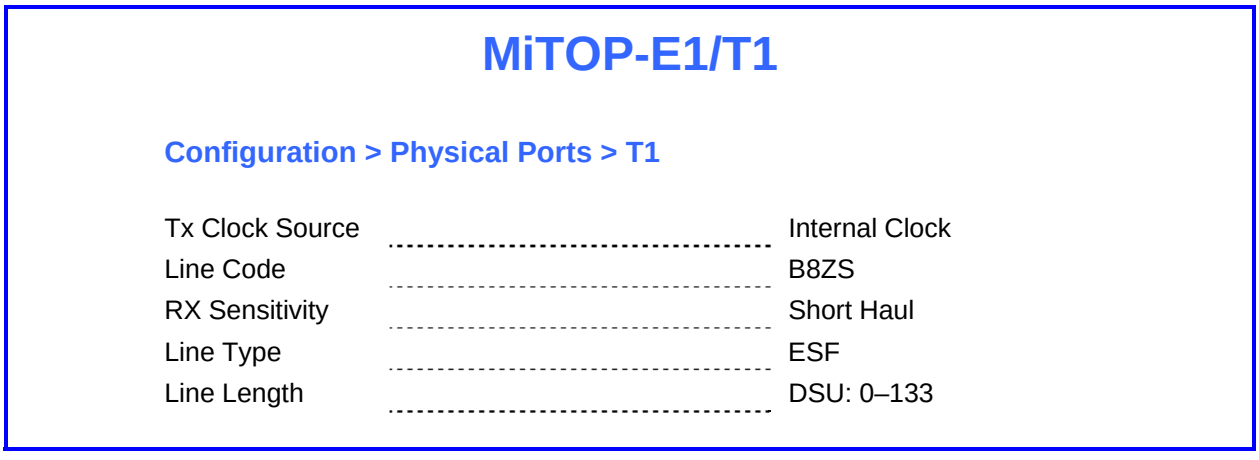


Figure 4-11. T1 Port Physical Layer Menu

Defining the Adaptive Clock Quality

When the Rx clock source of a TDM interface is set Adaptive, it is necessary to define the adaptive clock quality.

➤ **To define the adaptive clock quality:**

- From the Clock Recovery menu (Configuration › System › Clock Recovery), select the quality of the adaptive clock source: Stratum 1, Stratum 2, Stratum 3, Stratum 3E or Stratum 4.

Note *Clock mode is permanently set to Auto.*

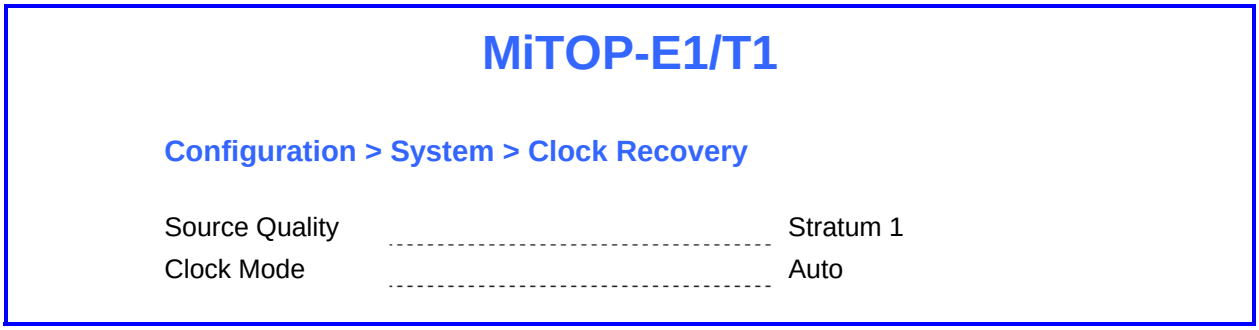


Figure 4-12. Clock Recovery Menu

Configuring Multiservice over PSN Application

MiTOP-E1/T1 units communicate with peer devices via pseudowire (PW) connections that are established over the packet-switched network.

Use the following procedure to create PW connections over the packet-switched network:

1. Define a MiTOP-E1/T1 peer device.
2. Create a pseudowire connection (PW), and configure its general, network and service parameters.

Defining a Peer

A peer is a device which communicates with MiTOP-E1/T1 over a PW connection.

➤ **To define a peer:**

- From the Peer menu (Configuration › Applications › Multiservice over PSN › Peer), perform the following:
  - In the **Peer Numbe**r field, enter the number of the peer to be added. Currently MiTOP-E1/T1 supports a single peer device, with Peer Number permanently set to 1.
  - In the **Peer Name** field, enter a description of the peer.
  - In the **Peer IP Address** field, enter an IP address of the peer device.
  - In the **Next Hop** field, enter the next hop address of the peer device.
  - In the **Peer MAC Address** field, enter a MAC address of the peer device.

When the changes are saved, MiTOP-E1/T1 displays the peer configuration summary.

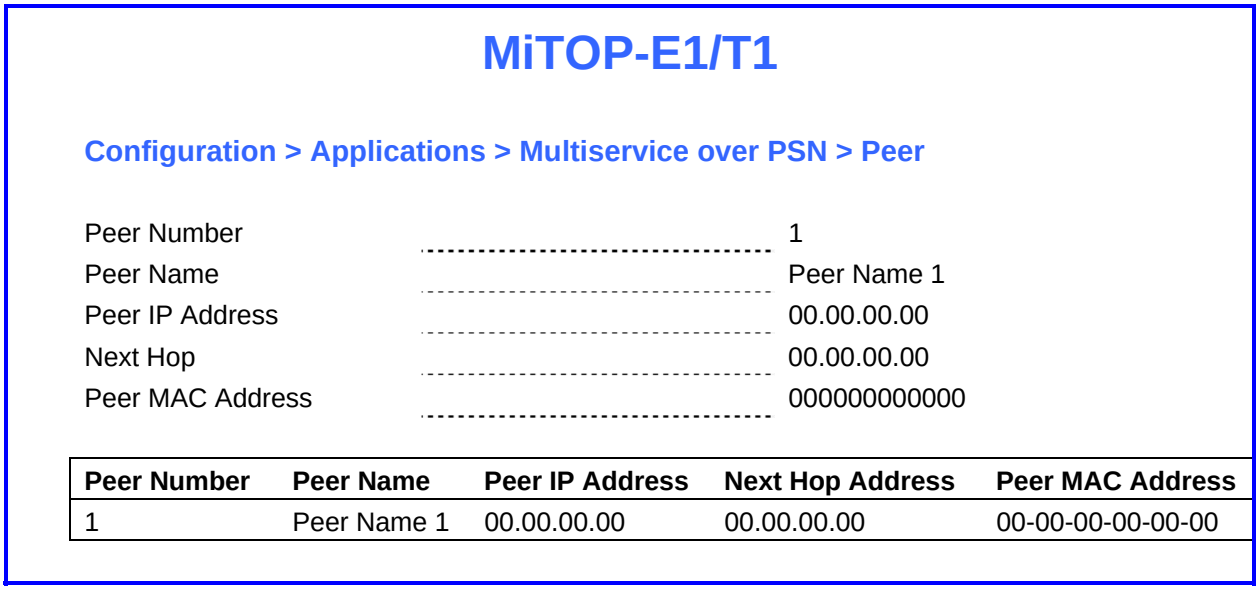


Figure 4-13. Peer Menu

Defining a Pseudowire Connection

For each pseudowire connection it is necessary to configure its general, PSN and service parameters. MiTOP-E1/T1 supports CESoPSN and SAToP payload encapsulation. PW connections can be established over MPLS, UDP/IPv4 or Ethernet (MEF) networks.

➤ **To define a PW:**

1. From the PW menu (Configuration › Applications › Multiservice over PSN › PW), configure the initial PW parameters (see *Figure 4-14* and *Table 4-1*).
2. Configure the general parameters of the PW (see *Figure 4-15* and *Table 4-2*).
3. Configure the PSN parameters of the PW (see *Figure 4-16* and *Table 4-3*).
4. Configure the service parameters of the PW (see *Figure 4-17* and *Table 4-4*).
5. Verify that the PW connection status is enabled. The status remains enabled only when valid values are defined for:
   - Peer IP Address (Configuration › Applications › Multiservice over PSN › Peer)
   - Source IP (Configuration › Applications › Multiservice over PSN › PW › General Parameters).
6. Save the changes.
7. Select View PW from the Multiservice over PSN menu to display the configuration summary of the PW connection.

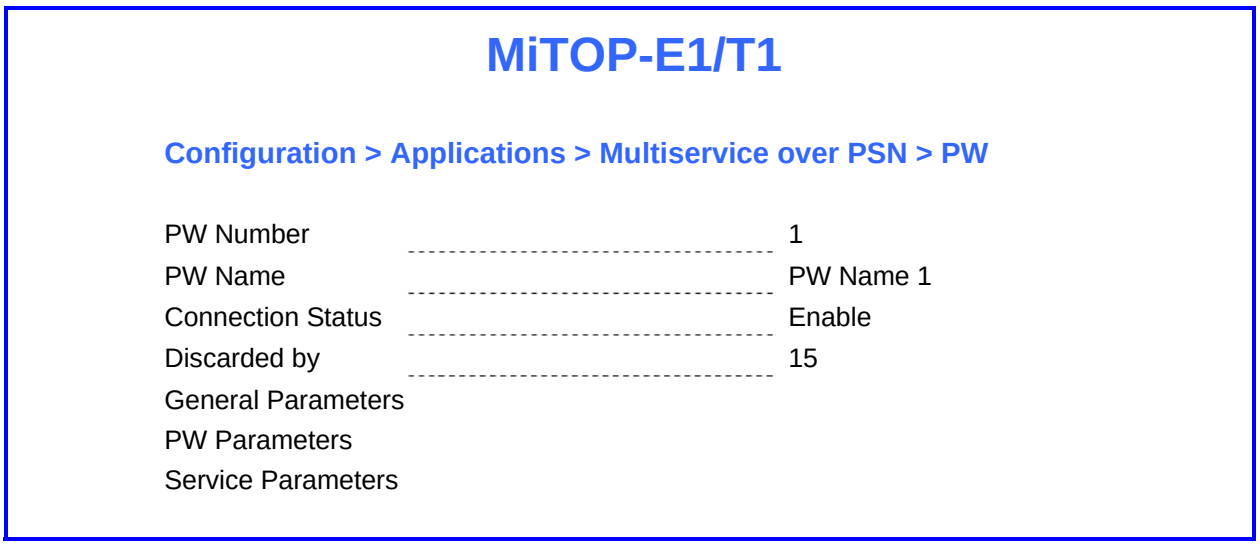


Figure 4-14. PW Menu

Table 4-1. PW Parameters

Parameter	Function	Values
PW Number	Number of pseudowire connection	**1** **Default: 1**
PW Name	User-defined name of the PW.	**Default: PW Name 1**
Discarded by	Defines the method for counting packets discarded on the pseudowire connection. The parameter value is binary, holding four bits. Each bit represents a different counter. Setting a bit to 1 enables the counter, and setting the bit to 0 disables it. • Counter [3] counts packets that were discarded because of jump operation that caused overflow in jitter buffer. • Counter [2] counts packets that were discarded due to incorrect sequence number. • Counter [1] counts packets that were discarded due to over-run state in jitter buffer. • Counter [0] counts packets that were discarded because they were considered duplicated, or because they were received too late to be inserted into the jitter buffer For example, to enable counters 3 and 1, set bits 3 and 1 to Enable. The value to be entered is 1 (1010b).	**0–15** **Default: 15**

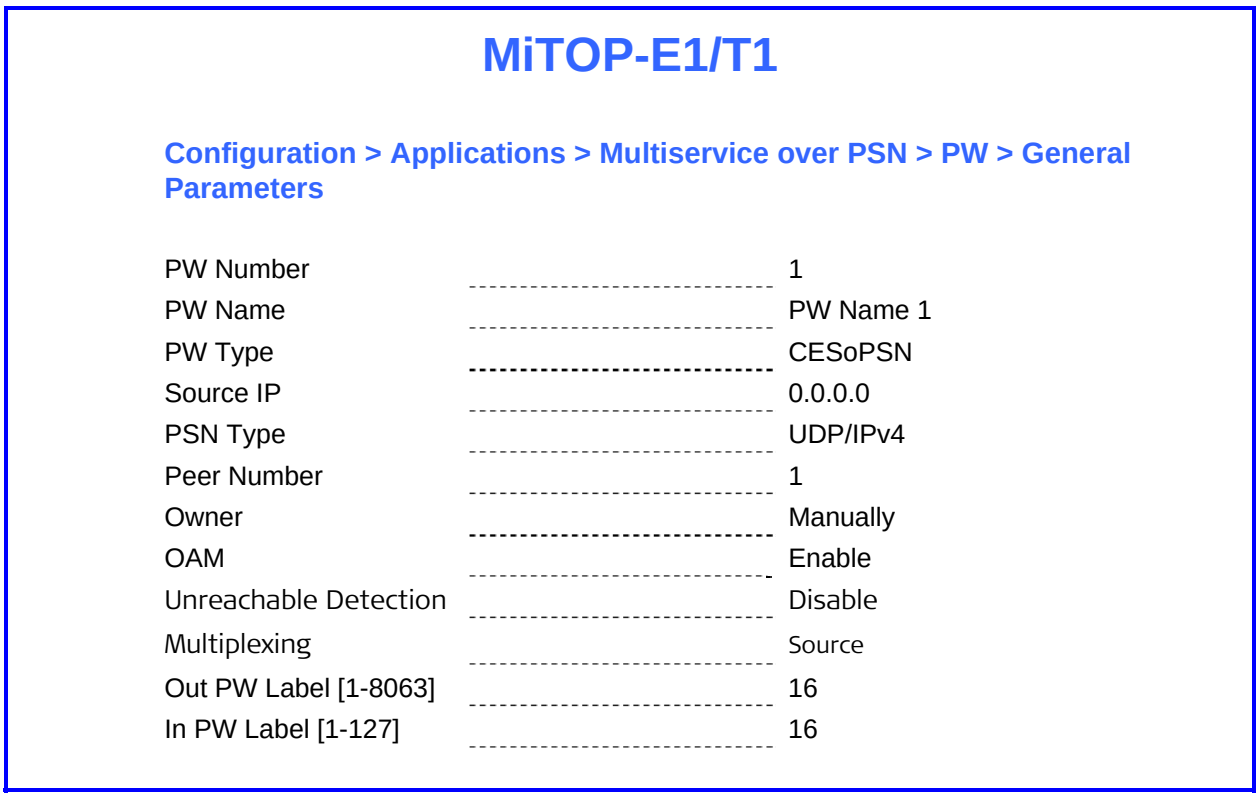


Figure 4-15. General Parameters Menu (CESoPSN PW, UDP/IPv4 Network)

Table 4-2. General Parameters

Parameter	Function	Values
PW Number	Number of pseudowire connection	**1** **Default: 1**
PW Name	User-defined name of the PW. This parameter is configured via the PW menu (*Figure 4-14*).	**Default: PW Name 1**
PW Type	Defines encapsulation type used for PW creation.	**CESoPSN** for framed E1/T1 service **SAToP** for unframed E1/T1 service **Default: CESoPSN**
Source IP	Defines the IP source address of the PW	**0.0.0.0** to **255.255.255.255** **Default: 0.0.0.0**
PSN Type	Defines the packet-switched network type. The PSN settings are configured via the PSN Parameters menu (see *Figure 4-16*).	**UDP/IPv4, MPLS, MEF** **Default: UDP/IPv4**
Peer Number	Specifies the name of peer, which terminates the PW	**1** **Default: 1**
Owner	Determines whether the PW is established manually or by LDP signaling. Currently, it is permanently set to Manually.	

Parameter	Function	Values
OAM	Controls OAM functionality required for correct communication with SFP-CA device. Always enable the OAM when operating MiTOP-E1/T1 with SFP-CA.	**Enable** – OAM is enabled **Disable** – OAM is disabled **Default: Enable**
Unreachable Detection	Defines whether MiTOP-E1/T1 recognizes or ignores the Unreachable Destination (ICMP type 3) packets	**Enable** – MiTOP-E1/T1 suspends PW operation for one minute when an Unreachable Destination (ICMP type 3) packet is received **Disable** – MiTOP-E1/T1 ignores Unreachable Destination packets **Default: Disable**
Multiplexing	Defines the UDP source and destination ports	**Source** – UDP destination port is 0x085E, and UDP source port is 0xC0000000 + Out PW label **Destination –** UDP destination port is 0xC0000000 + Out PW label, UDP source port is 0xC0000000 + In PW label **Default: Source**
Out PW Label	Defines the outgoing (egress) PW label	**1–8063** **Default: 16**
In PW Label	Defines the incoming (ingress) PW label	**1–127** **Default: 16**

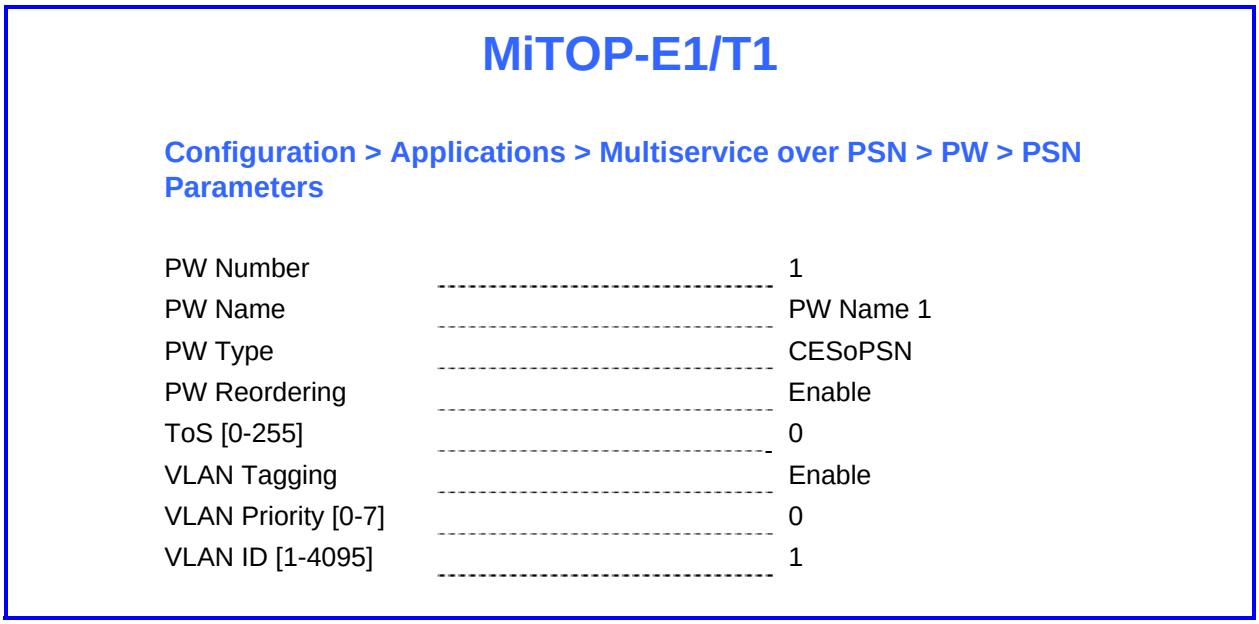

MiTOP-E1/T1
Configuration > Applications > Multiservice over PSN > PW > PSN Parameters
PW Number 1
PW Name PW Name 1
PW Type CESoPSN
PW Reordering Enable
ToS [0-255] 0
VLAN Tagging Enable
VLAN Priority [0-7] 0
VLAN ID [1-4095] 1

Figure 4-16. PSN Parameters Menu (UDP/IP Network)

Table 4-3. PSN Parameters

Parameter	Function	Values
PW Number	Number of pseudowire connection	**1**
PW Name	User-defined name of the PW. This parameter is configured via the PW menu (*Figure 4-14*).	**PW Name 1**
PW Type	Defines encapsulation type used for PW creation (see *Figure 4-15*)	**CESoPSN**, **SAToP**
PW Reordering	Controls the packet reordering function	**Enable** – Packet reordering is enabled **Disable** – Packet reordering is disabled **Default: Enable**
ToS	Defines the ToS bit value	**0-255** **Default: 0**
VLAN Tagging	Controls the use of VLAN tagging	**Enable –** VLAN tagging is enabled **Disable** – VLAN tagging is disabled **Default: Disable**
VLAN Priority	Defines VLAN priority value if VLAN tagging is enabled	**0–7** **Default: 0**
VLAN ID	Defines VLAN tag value if VLAN tagging is enabled	**0–4095** **Default: 1**
Ingress Label	Defines the ingress MPLS tunnel label (PSN to MiTOP-E1/T1 direction). Valid for MPLS networks only.	**16–65535** **Default: 16**
Egress Label	Defines the egress MPLS tunnel label (MiTOP-E1/T1 to PSN direction). Valid for MPLS networks only.	**16–65535** **Default: 16**
EXP Bits	Defines the EXP bits value to be used for outgoing traffic. Valid for MPLS networks only.	**0–7** **Default: 0**
TTL	Defines time-to-live value for the PW. Valid for MPLS networks only.	**0–255** **Default: 0**

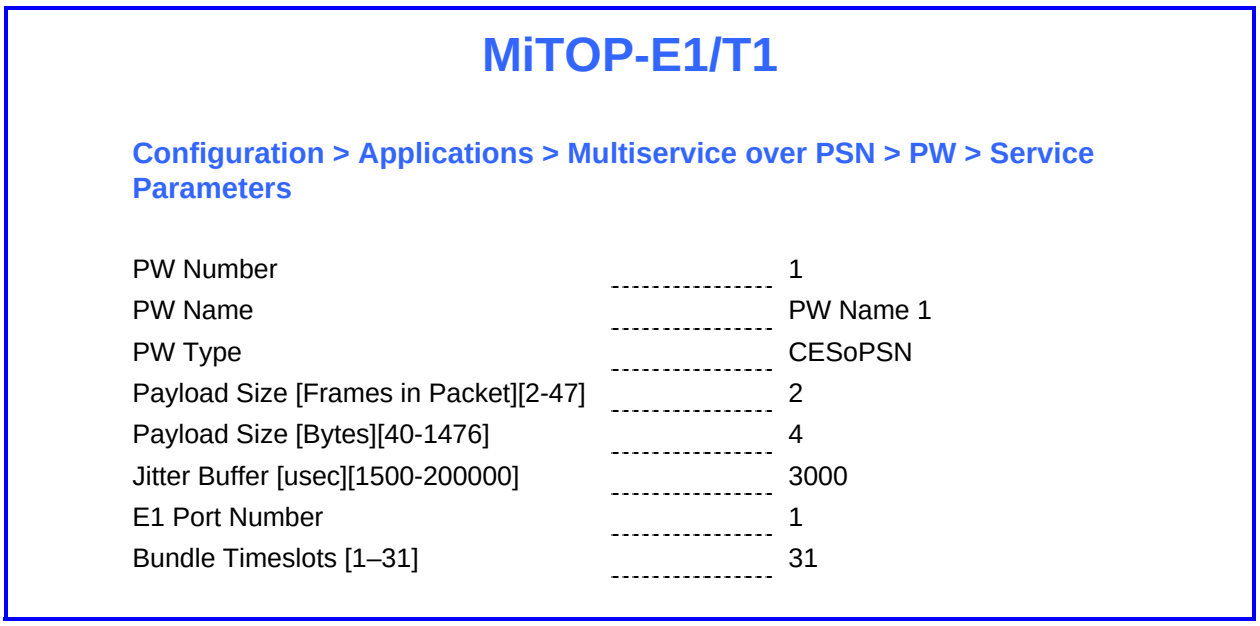

MiTOP-E1/T1
Configuration > Applications > Multiservice over PSN > PW > Service Parameters
PW Number ---------- 1
PW Name ---------- PW Name 1
PW Type ---------- CESoPSN
Payload Size [Frames in Packet][2-47] ---------- 2
Payload Size [Bytes][40-1476] ---------- 4
Jitter Buffer [usec][1500-200000] ---------- 3000
E1 Port Number ---------- 1
Bundle Timeslots [1–31] ---------- 31

Figure 4-17. Service Parameters Menu (CESoPSN PW)

Table 4-4. Service Parameters

Parameter	Function	Values
PW Number	Number of pseudowire connection	**1**
PW Name	User-defined name of the PW. This parameter is configured via the PW menu (*Figure 4-14*).	**Default**
PW Type	Defines encapsulation type used for PW creation (see *Figure 4-15*)	**CESoPSN**, **SAToP**
Payload Size	Defines PDU payload length for the PW. CESoPSN PW – Number of TDM frames in a packet, SAToP – Number of bytes in a packet.	CESoPSN: **2–47** (E1), **2–60** (T1) SAToP: **30–1476** **Default: 4** (CESoPSN), **128** (SAToP)
Payload Size	Translates the bytes per packet payload size value into bytes by multiplying the payload size by: • 31 (E1) or 24 (T1) for CESoPSN • 32 (E1) or 25 (T1) for SAToP.	
Jitter Buffer	Jitter buffer size for the PW	**1500–200000** µsec (CESoPSN) **500–200000** µsec (SAToP) **Default: 1500** (CESoPSN), **500** (SAToP)
E1 Port Number	Permanently set to 1.	**1**
Bundle Time Slots	Read-only field reserved for future versions.	**31**

4.3 Additional Tasks

This section describes additional operations available supported by the MiTOP-E1/T1 management software, including the following:

- Displaying inventory
- Displaying the MiTOP-E1/T1 status information at the system, physical and connection levels
- Restoring defaults
- Resetting the unit.

Displaying the MiTOP-E1/T1 Inventory

The MiTOP-E1/T1 inventory displays description of the unit, its hardware, firmware and software revisions, serial number etc.

➤ **To display the MiTOP-E1/T1 inventory:**

- From the Main menu, select **Inventory**.

  The Inventory menu appears.

MiTOP-E1/T1

Inventory

ID	Description	Vendor Type	Class	Entity Name	HWRev	FWRev	SWRev	Serial No	Alias	Asset ID	FRU
1	RAD.MiTOP.E1	0	3	MiTOP-E1	0.0	0.0	1.0	123456789		0	True

Figure 4-18. Inventory Screen

Displaying MiTOP-E1/T1 Status

The MiTOP-E1/T1 software provides access to the following status information:

- System level – MAC address and system uptime period
- Physical ports – status of the physical layer alarms and errors
- Connection level – status of the PW connection.

Displaying System Status Information

The System menu includes:

- MAC address of the MiTOP-E1/T1 unit
- MAC address of the PW
- MiTOP-E1/T1 uptime (time elapsed since the last reset in the dd:hh:mm:ss format).

It also provides access to the log file. For description of MiTOP-E1/T1 system messages, which are displayed via the Log File screen, refer to *Chapter 6*.

➤ **To display the system status information:**

- From the Monitoring menu, select **System**.

  The System menu is displayed (see *Figure 4-19*).

Figure 4-19. System Status Screen

Displaying the TDM Physical Layer Status

You can view the status of the TDM link at the physical level.

➤ **To display the TDM physical layer information:**

1. From the Monitoring menu, select **Physical Layer**.

   The Physical Layer menu is displayed.

2. From the Physical Layer menu, select **Status**.

   The TDM Status screen is displayed.

   The TDM Status screen includes information on the status of the link and physical layer errors.

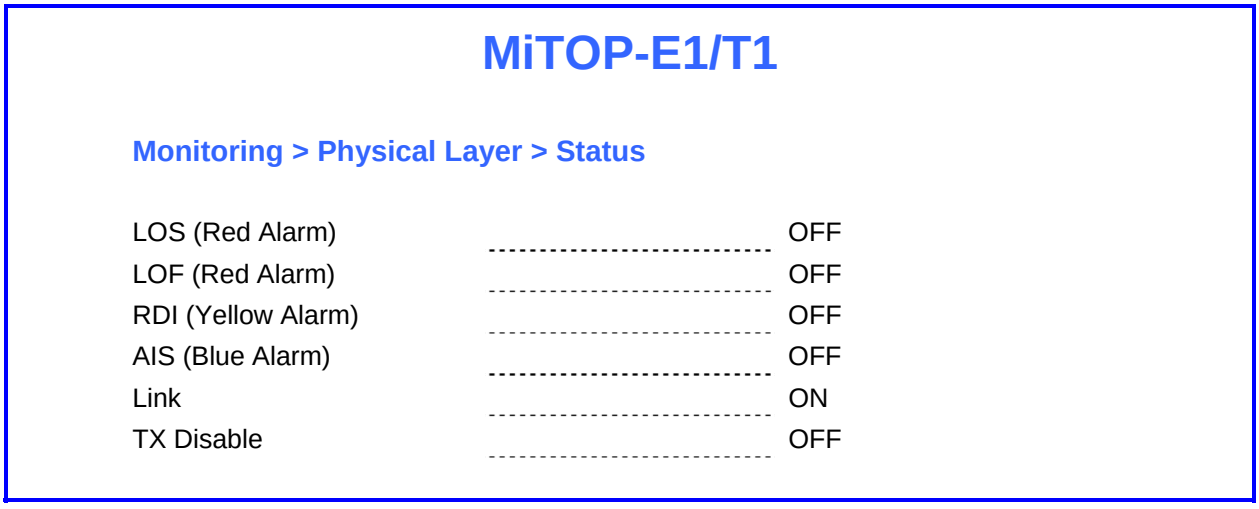


Figure 4-20. Physical Layer Status Screen

Displaying the PW Connection Status

You can view the status of the PW connection at the physical level.

➤ **To display the PW connection status information:**

- From the Physical Layer menu (Monitoring > Physical Layer), select **Connections Status**.

  The Connection Status screen is displayed.

  The Connection Status parameters are described below.

  - Destination IP address – IP address of the destination device

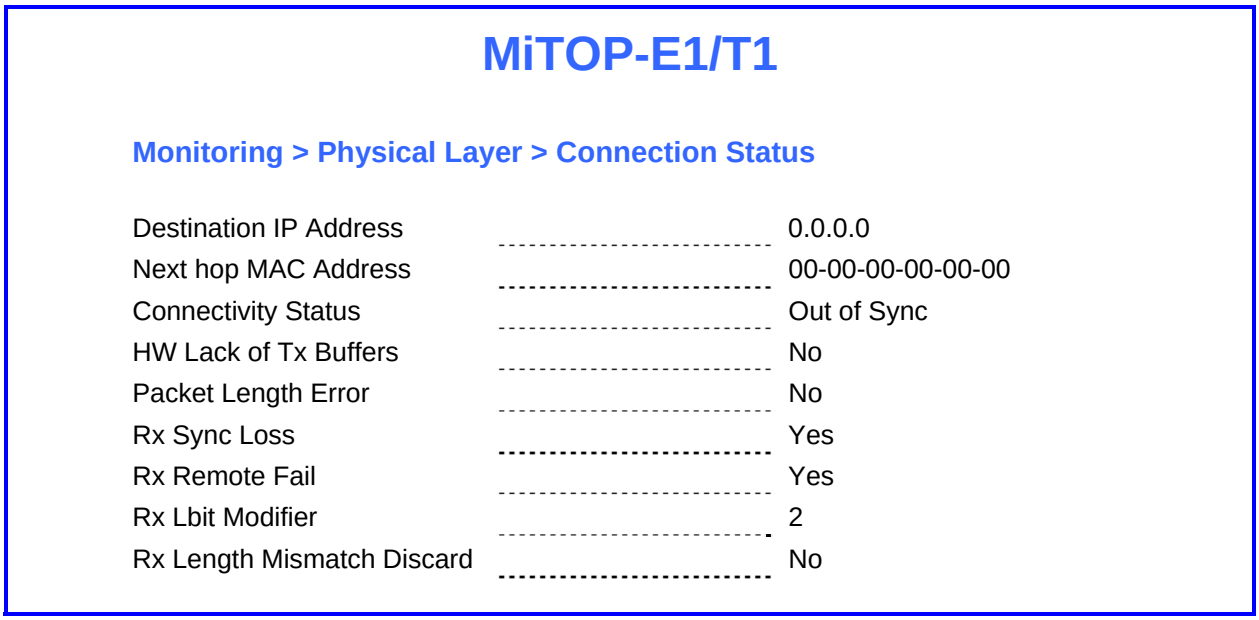

MiTOP-E1/T1
Monitoring > Physical Layer > Connection Status
Destination IP Address 0.0.0.0
Next hop MAC Address 00-00-00-00-00-00
Connectivity Status Out of Sync
HW Lack of Tx Buffers No
Packet Length Error No
Rx Sync Loss Yes
Rx Remote Fail Yes
Rx Lbit Modifier 2
Rx Length Mismatch Discard No

Figure 4-21. Connection Status Screen

Table 4-5. Connection Status Parameters

Parameter	Description
Destination IP Address	IP address of the destination device
Next Hop MAC Address	MAC address of the next hop device
Connectivity Status	Status of the OAM connection: • Out of sync • Not valid • Sync
Packet Length Error	Packet discarded due to mismatch between IP length or control word length and actual length
Rx Sync Loss	Received packet with "L" indication
Rx Remote Fail	Received packet with "R" indication
Rx Lbit Modifier	Received packet with "M" indication
Rx Length Mismatch Discard	Packet discarded due to mismatch between the configured and actual packet length

Restoring Defaults

You can restore the MiTOP-E1/T1 default settings.

➤ **To restore the MiTOP-E1/T1 default settings:**

1. From the System menu (Configuration › System), select **Set Factory Defaults**.

   MiTOP-E1/T1 displays the following message: **`The device will restart. Do you wish to proceed? (Y/N)`**.

2. Click **Y** to confirm the action.

Resetting MiTOP-E1/T1

You can perform the overall reset of MiTOP-E1/T1.

➤ **To reset MiTOP-E1/T1:**

1. From the System menu (Configuration › System), select **Reset Device**.

   The following confirmation message appears: **`The device will restart. Do you want to proceed? (Y/N)`**

2. Click **Y** to confirm the action.

Chapter 5

Configuring a Typical Application

This chapter provides detailed instructions for setting up a typical application using a MiTOP-E1/T1 unit.

Note

Configuration values shown in this chapter are examples only.

5.1 Introduction

This chapter explains how to configure a typical pseudowire application, using MiTOP-E1/T1 delivering a full E1 stream to a central Gmux-2000 with GbE and E1-PW/28 modules. MiTOP-E1/T1 is installed in the Fast Ethernet port of the ETX-550 aggregator.

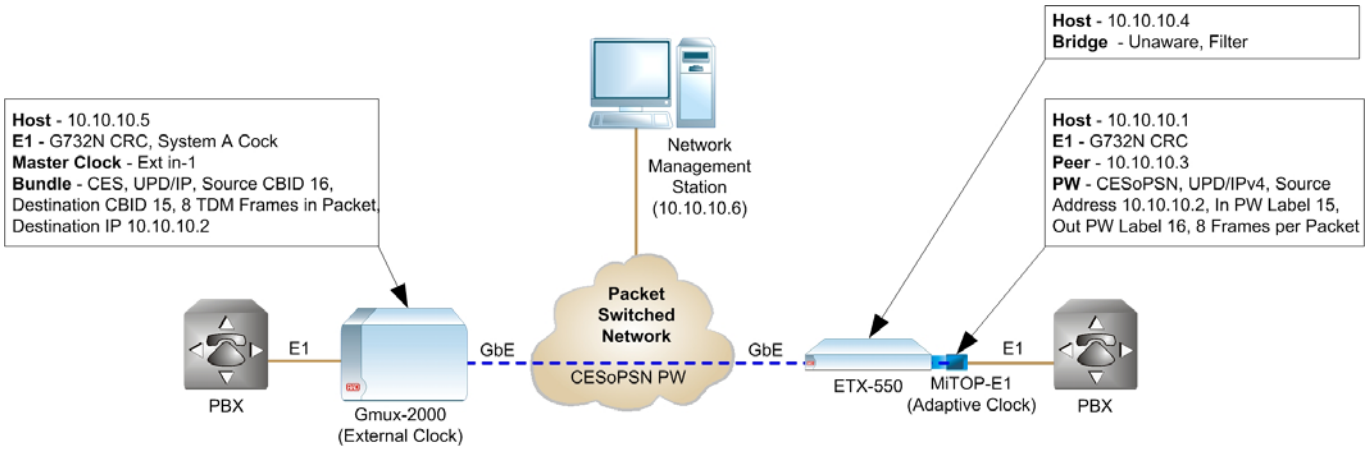

Host - 10.10.10.4
Bridge - Unaware, Filter
Host - 10.10.10.5
E1 - G732N CRC, System A Cock
Master Clock - Ext in-1
Bundle - CES, UPD/IP, Source CBID 16, Destination CBID 15, 8 TDM Frames in Packet, Destination IP 10.10.10.2
Network Management Station (10.10.10.6)
Host - 10.10.10.1
E1 - G732N CRC
Peer - 10.10.10.3
PW - CESoPSN, UPD/IPv4, Source Address 10.10.10.2, In PW Label 15, Out PW Label 16, 8 Frames per Packet
Packet Switched Network
CESoPSN PW
E1
GbE
GbE
E1
PBX
Gmux-2000 (External Clock)
ETX-550
MiTOP-E1 (Adaptive Clock)
PBX

Figure 5-1. Typical Pseudowire Application

The order of the configuration steps detailed below is optional. You can configure the three devices used in the sample application in any suitable order.

1. Configuring MiTOP-E1/T1:
   a. Setting host IP parameters
   b. Configuring E1 at the physical level
   c. Defining the pseudowire peer
   d. Configuring the general and service parameters of the pseudowire connection.

2. Configuring ETX-550:
   a. Setting the management parameters (host IP, network manager)
   b. Configuring the bridge mode.
3. Configuring Gmux-2000:
   a. Loading and verifying the hardware configuration
   b. Setting the management parameters (host IP, network manager)
   c. Selecting a system clock
   d. Configuring the E1 interface at the physical level
   e. Configuring the bundle
   f. Connecting the E1 port to the bundle.

5.2 Configuring MiTOP-E1/T1

MiTOP-E1/T1, installed in the ETX-550 Ethernet aggregator, packetizes and encapsulates the E1 TDM traffic to be carried over the UPD/IP network to Gmux-2000.

Configuring the Host IP Parameters

The host IP address serves as a destination of the management traffic. The default host IP address is 192.168.205.1.

➤ To configure the host IP parameters:

- In the **IP Address** field of the Host IP menu (Configuration › System › Management › Host IP), enter the new host IP address – 10.10.10.1.

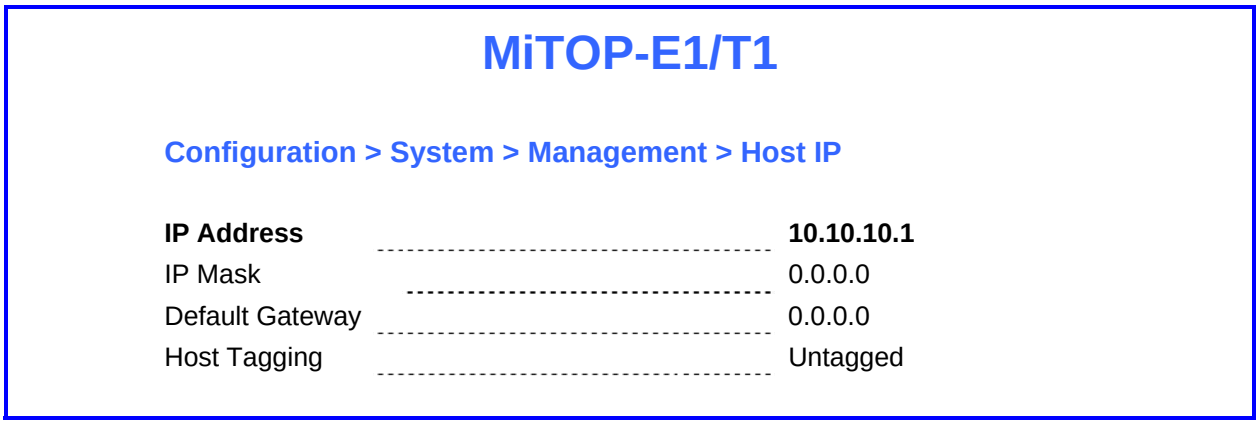


Figure 5-2. Configuring the Host IP Address

Configuring the E1 Interface at the Physical Level

Before creating a pseudowire connection, configure the physical layer parameters of the E1 TDM interface.

➤ To configure the physical layer of the E1 interface:

- From the E1 menu (Configuration › Physical Ports › E1), set:
  - TX Clock Source: Adaptive
  - Line Type: G.732N CRC.

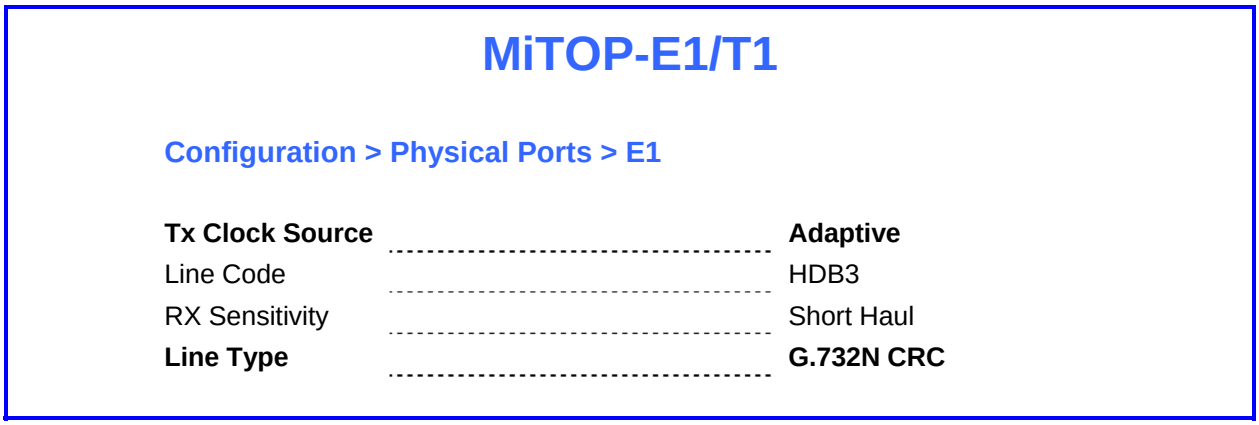

MiTOP-E1/T1
Configuration > Physical Ports > E1
Tx Clock Source ..... Adaptive
Line Code HDB3
RX Sensitivity ..... Short Haul
Line Type ..... G.732N CRC

Figure 5-3. Configuring the Physical Layer of the E1 Interface

Defining a Pseudowire Peer

Gmux-2000 serves as a peer device for MiTOP-E1/T1.

➤ To define the pseudowire peer:

- From the Peer menu (Configuration › Applications › Multiservice over PSN › Peer), set:
  - Peer IP Address: 10.10.10.5
  - Peer MAC Address: 01-d3-10-fe-32-2a

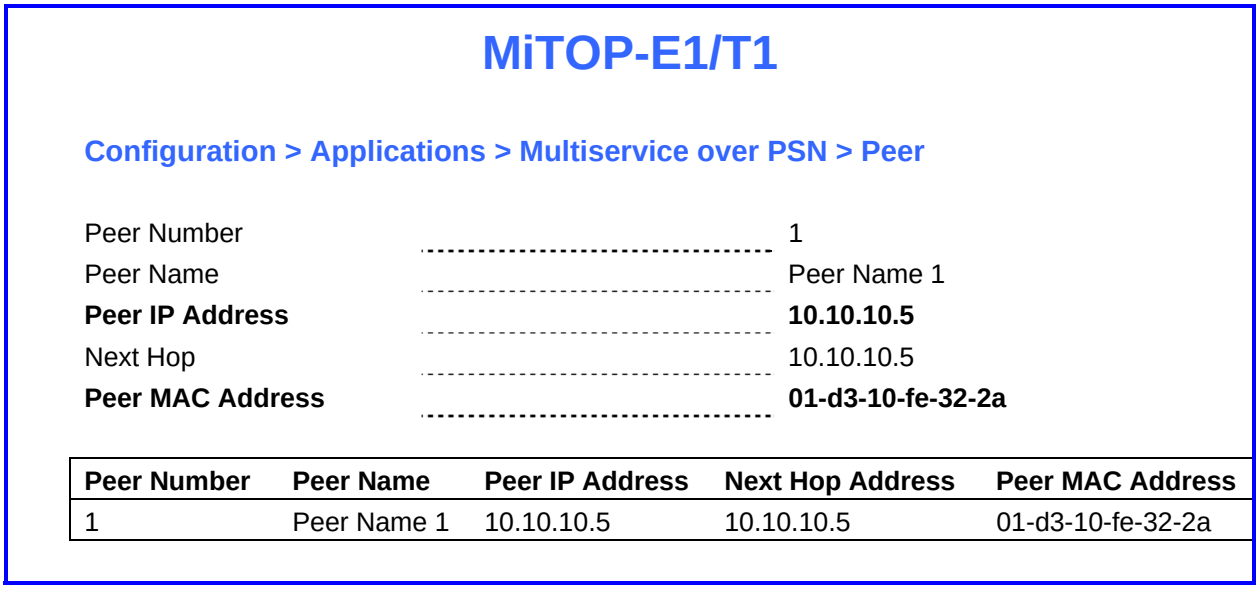

MiTOP-E1/T1
Configuration > Applications > Multiservice over PSN > Peer
Peer Number 1
Peer Name ..... Peer Name 1
Peer IP Address 10.10.10.5
Next Hop 10.10.10.5
Peer MAC Address 01-d3-10-fe-32-2a
Peer Number | Peer Name | Peer IP Address | Next Hop Address | Peer MAC Address
1 | Peer Name 1 | 10.10.10.5 | 10.10.10.5 | 01-d3-10-fe-32-2a

Figure 5-4. Defining the Peer

Configuring a Pseudowire Connection

The pseudowire connection must be configured to use the CESoPSN encapsulation and UPD/IP network connectivity.

➤ **To configure a pseudowire connection:**

1. From the General Parameters menu (Configuration › Applications › Multiservice over PSN › PW › General Parameters), set:
   - Source IP: 10.10.10.2
   - PW Type: CESoPSN
   - PSN Type: UDP/IPv4

MiTOP-E1/T1

Configuration > Applications > Multiservice over PSN > PW > General Parameters

PW Number	1
PW Name	PW Name 1
PW Type	**CESoPSN**
Source IP	**10.10.10.2**
PSN Type	**UDP/IPv4**
Peer Number	1
Owner	Manually
OAM	Enable
Unreachable Detection	Disable
Multiplexing	Source
Out PW Label [1-8063]	**16**
In PW Label [1-127]	**15**

Figure 5-5. Configuring General PW Parameters

2. From the Service Parameters menu (Configuration › Applications › Multiservice over PSN › PW › Service Parameters), set the Payload Size to 8.

MiTOP-E1/T1

Configuration > Applications > Multiservice over PSN > PW > Service Parameters

PW Number	----------	1
PW Name	----------	PW Name 1
PW Type	----------	CESoPSN
Payload Size [Frames in Packet] [2-47]	----------	**8**
Payload Size [Bytes] [40-1476]	----------	248
Jitter Buffer [usec] [1500-200000]	----------	1500
E1 Port Number	----------	1
Bundle Timeslots [1–31]	----------	31

Figure 5-6. Configuring PW Payload Size

5.3 Configuring ETX-550

ETX-550 is an Ethernet aggregator that receives the Fast Ethernet traffic from MiTOP-E1/T1 and transmits it towards the PSN via its Gigabit Ethernet interface.

Setting the Management Parameters

Define the host IP address and add the NMS to the manager list in order to establish a proper management link to ETX-550.

➤ **To configure the host IP address:**

- From the Host menu (Configuration › System › Host), set the host IP address to 10.10.10.4.

```
                                    ETX-550
Configuration>System>Management>Host

1. IP Address          ... (10.10.10.4)
2. IP Mask             ... (0.0.0.0)
3. Default Gateway      ... (0.0.0.0)
4. Read Community      ... (Public)
5. Write Community     ... (Private)
6. Trap Community      ... (Public)
7. DHCP Client         >
8. Encapsulation       >
>
ESC-prev.menu; !-main menu; &-exit                                  1 Mngr/s
```

Figure 5-7. Configuring Host IP Parameters for ETX-550

➤ **To add a network manager:**

1. From the Management menu (Configuration › System › Management), select **Manager List**.

   The Management List menu appears.

2. Use the arrow keys to move the cursor to the **Manager IP** field, select Change Cell by typing **1** and enter the IP address of the management station.

3. Move the cursor to the **Manager IP Mask** field, select Change Cell by typing **1** and enter the subnet mask of the management station.

```
                                    ETX-550
Configuration>System>Management>Manager List
 Manager ID   IP Address       IP Mask           Manager Trap Mask
 1            10.10.10.4       255.255.255.0     Disable
 2            0.0.0.0          255.255.255.0     Disable
 3            0.0.0.0          255.255.255.0     Disable
 4            0.0.0.0          255.255.255.0     Disable
 5            0.0.0.0          255.255.255.0     Disable
 6            0.0.0.0          255.255.255.0     Disable
 7            0.0.0.0          255.255.255.0     Disable
 8            0.0.0.0          255.255.255.0     Disable
 9            0.0.0.0          255.255.255.0     Disable
 10           0.0.0.0          255.255.255.0     Disable
x - Clear Table; d - Clear row
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 5-8. Adding a Network Manager for ETX-550

5.4 Configuring Gmux-2000

Gmux-2000 is a pseudowire gateway, which accepts the CESoPSN PW originating from MiTOP-E1/T1, retrieves the TDM data and sends to the PBX. In addition, Gmux-2000 receives a clock from an external source and supplies it as adaptive timing to MiTOP-E1/T1.

Loading and Verifying the Hardware Configuration

When powering Gmux-2000 for the first time, the first step is to load the hardware configuration, to cause Gmux-2000 to recognize the GbE and E1-PW/28 modules installed into the chassis.

➤ **To load and verify the hardware configuration:**

1. From the Load Hardware menu (Config › Database tools › Load hardware), load the necessary configuration, save and update the database.

2. From the Card Type menu (Config › System › Card Type) verify the correct hardware configuration. Manually include any missing modules.

```
                          Pseudowire Gateway
Config>System>Card type

  SLOT:    PS-1      PS-2      PS-3      CL-1      CL-2
  DB  :    PS-AC     PS-AC   PS-AC       CL     ---------

  SLOT:    IO/1      IO/2      IO/3      IO/4      IO/5
  DB  :   CES E1     CES E1 --------- --------- ---------

  SLOT:    IO/6      IO/7      IO/8      IO/9
  DB  :    GBeth   --------- ---------  ---------

 1. ---------
 2. PS-AC
 3. PS-DC
```

Figure 5-9. Verifying the Hardware Configuration of Gmux-2000

Configuring Management Parameters

Configure the MiTOP-E1/T1 IP addresses to be used for the bundle connectivity and management. Also add the NMS IP address to the manager list.

➤ To configure the host IP address:

- From the Host IP menu (Config›System›Host IP), set the IP address of the GbE module to 10.10.10.5.

```
                          Pseudowire Gateway
Config>System>Host IP

  INTERFACE        IP ADDRESS        IP MASK            DEFAULT GATEWAY
  ONLINE CL:         0.0.0.0         0.0.0.0               0.0.0.0
  GBETH 1/IF 1:     10.10.10.5       0.0.0.0               0.0.0.0
  GBETH 1/IF 2:      0.0.0.0         0.0.0.0               0.0.0.0
```

Figure 5-10. Configuring the Host IP Parameters for Gmux-2000

➤ To add a network manager:

1. From the Manager List menu (Config › System › Management › Manager list), press **A** to add a manager to the manager list.
2. Set:
   - IP Address: 10.10.10.6.
   - Interface: GIG A-IO 6/1

```
                              Pseudowire Gateway
Config>System>Management>Manager list

   MNG NUM[1 - 100]                          ... (1)
 1. IP ADDRESS                               ... (10.10.10.6)
 2. NEXT HOP                                 ... (0.0.0.0)
 3. INTERFACE                                >   (GIG A-IO 6/1)
 4. TRAP(FOR MANAGER)                            (No)
 5. VLAN VALID                                   (No)
   VLAN ID[0 - 4095]                         ... (0)
   VLAN PRIORITY[0 - 7]                      ... (0)
```

Figure 5-11. Adding a Network Manager for Gmux-2000

Configuring the System Clock

Select the external clock, received via the STATION clock interface of the CONTROL module, as a timing reference for the system.

➤ **To select the system clock:**

- From the Master Clock menu (Config › System › Clock source › System A › Master clock), set the master clock source to Ext in-1.

```
                              Pseudowire Gateway
Config>System>Clock source>System A>Master clock

1. Master clock source           >   (Ext in-1)
2. Save parameters
```

Figure 5-12. Selecting the Gmux-2000 System Clock

Configuring the E1 Interface at the Physical Level

Before creating a bundle, configure the physical layer parameters of the external E1 interface.

➤ **To configure the physical layer of the external E1 interface:**

- From the E1 Port menu (Config › Physical layer › E1 port), set:
  - Channel ID: 1
  - Transmit Clk Source: System A
  - Line Type: Framed G.704 CRC.

```
                          Pseudowire Gateway
Config>Physical layer>E1 port -  (IO 1: EXT PORT 1 CARD TYPE- CES E1)

 1. Channel ID[1 - 28]           ... (1)
 2. Admin Status                     (Connected)
 3. Idle code[0 - ff]            ... (7E)
 4. OOS Signaling                >   (Space)
 5. OOS code[0 - ff]             ... (FF)
 6. Transmit clk source          >   (System a)
 7. Rx Sensitivity               >   (Short Haul)
 8. Bundle number[1 - 2000]      ... (0)
 9. TS type                          (NC)
10. Line type                    >   (Framed G.704 CRC)
11. Restoration Time             >   (CCITT)
```

Figure 5-13. Configuring the Physical Layer of the Gmux-200 External E1 Port

Configuring the Bundle

A bundle is a pseudowire connection to be attached to the MiTOP-E1/T1 PW to complete the communication link.

➤ To configure the bundle:

1. From the Connection menu (Config›Connection), type **X** to add a new bundle.
2. Set the new bundle connection mode to CES and PSN type to UDP/IP.

```
Config>Connection

 1. Bundle ID[1 - 2000]                  ... (1)
 2. Connection mode                  >   (CES)
 3. PSN type                             (UDP/IP)
 4. Connection configuration     []>
 5. Save parameters
```

Figure 5-14. Selecting Connection Mode and PSN Type for Gmux-2000

3. From the Connection Configuration menu (Config › Connection › Connection configuration), set:
   - Connection State: Enable
   - Source CBID: 16
   - Dest CBID: 15
   - TDM frame in packet: 8
   - OAM Connectivity: Disable
   - Far end type: E1
   - Destination IP: 10.10.10.2
   - Network slot port: 6/1.

```
                        Pseudowire Gateway
Config>Connection>Connection configuration -  (BUNDLE 1)

  Connection state              Enable
  Source CBID                   16
  Dest CBID                     15
| Payload format                V2
v TDM frame in packet           8
  Jitter buffer in Ms[0-200]    15
  OAM connectivity              Disable
  Payload type                  Data
| Far end type                  E1
  OOS L bit mode                TX OOS and L bit
| Destination IP                10.10.10.2
v Network slot port             6/1
  Next hop                      0.0.0.0
  IP TOS                        0
  Adaptive clock                Disable
  VLAN tagging                  Disable
```

Figure 5-15. Configuring the Gmux-2000 Bundle Parameters

Connecting the E1 Port to the Bundle

Now associate the bundle with the E1 port 1 of the E1-PW/28 installed in I/O slot 1 by specifying the just-configured bundle index number.

➤ To connect the E1 port to the bundle:

- From the Assign Entire Port to Bundle menu (Config › TS Assignment › Assign entire port to bundle), select the bundle number and choose Connect Entire Port to Bundle.

```
                              Pseudowire Gateway
Config>TS Assignment>Assign entire port to bundle

 1. Bundle number[1 - 2000]            ... (1)
 2. Connect entire port to bundle
 3. Disconnect entire port from bundle
```

Figure 5-16. Connecting the Entire E1 Port to the Bundle

Chapter 6

Diagnostics and Troubleshooting

This chapter describes how to:

- Monitor performance
- Display system messages
- Run diagnostic tests.

6.1 Monitoring Performance

Displaying the TDM Statistics

The E1 and T1 performance monitoring data is collected at the physical level.

➤ **To display the TDM statistics:**

1. From the E1 or T1 menu (Monitoring › Physical Layer › E1 or T1), select one of the following:
   - Current – the statistics collected during the last second
   - 15 min – the statistics collected during the current 15 minute interval.

   Table 6-1 describes the Ethernet statistic registers.
2. Click **Refresh** to refresh the screen.

➤ **To clear the TDM statistics:**

- From the E1 or T1 menu (Monitoring › Physical Layer › E1 or T1), select **Clear Statistics**.

MiTOP-E1/T1

Monitoring > Physical Layer > E1 > Current Statistics

ES	0
SES	0
UAS	0
BES	0

Figure 6-1. Current TDM Physical Layer Statistics Screen

Table 6-1. TDM Statistics Parameters

Parameter	Description
ES	Number of Errored Seconds. For ESF and E1-CRC links an Errored Second is a second with one of the following events: • One or more Path Code Violations • One or more Out of Frame defects • One or more Controlled Slip events • AIS defect. For D4 and E1 without CRC links, the presence of Bipolar Violations also triggers an Errored Second event. This is not incremented during an Unavailable Second.
SES	Number of Severely Errored Seconds. For ESF links a SES is a second with one of the following events: • 320 or more Path Code Violation Error Events • One or more Out of Frame defects • AIS defect. For E1-CRC signals, a SES is a second with one of the following events: • 832 or more Path Code Violation error events • One or more Out of Frame defects. For E1 without CRC, a SES is a second with 2048 LCVs or more. For D4 signals, a Severely Errored Second is a count of one-second intervals with one of the following: • Framing Error event • OOF defect • 1544 or more LCVs. Controlled slips are not included in this parameter. This is not incremented during an Unavailable Second.
UAS	Number of Unavailable Seconds. Unavailable Seconds (UAS) are calculated by counting the number of seconds when the interface is unavailable. The interface is unavailable from the onset of 10 contiguous SESs, or the onset of the condition leading to a failure.
BES	Number of Bursty Errored Seconds. A BES is a second with fewer than 320 and more than 1 Path Coding Violation error events, without Severely Errored Frame defects and no detected incoming AIS defects. Controlled slips are not included in this parameter. This is not incremented during an Unavailable Second.

Displaying the Ethernet Statistics

The Ethernet performance monitoring data is collected at the physical level.

➤ **To display the Ethernet statistics:**

1. From the Physical Layer menu (Monitoring › Physical Layer), select **Ethernet Statistics**:

   The Ethernet Statistics screen is displayed.

2. Click **Refresh** to refresh the screen.

➤ **To clear the Ethernet statistics:**

- From the Ethernet Statistics menu, select **Clear Statistics**.

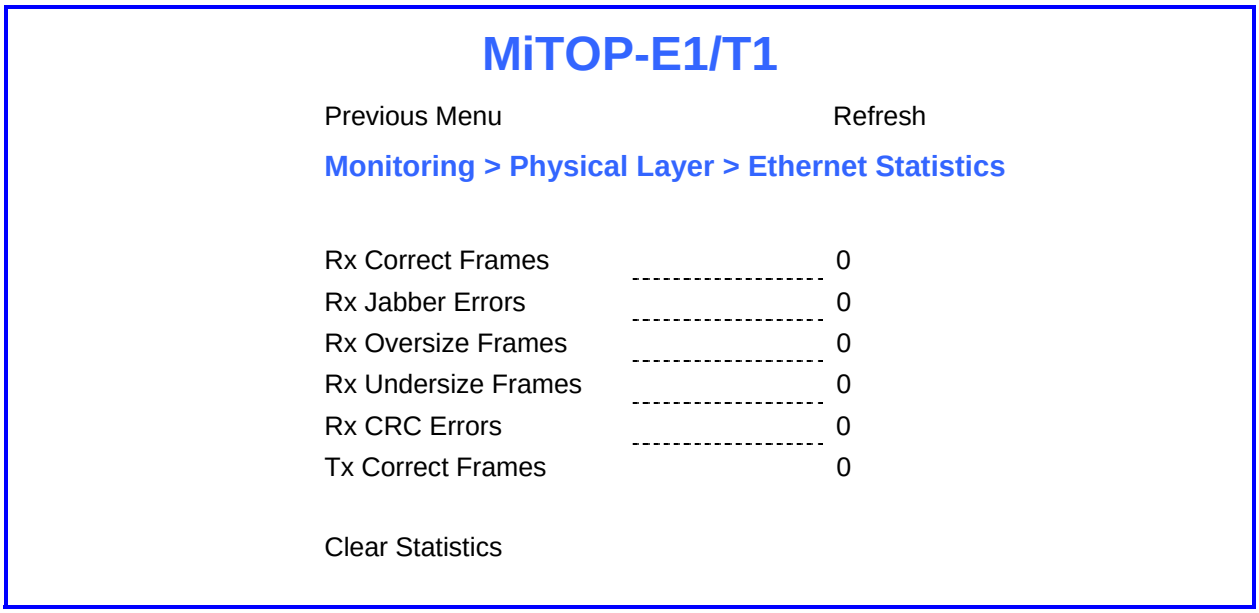


Figure 6-2. Ethernet Physical Layer Statistics Screen

Table 6-2. Ethernet Statistics Parameters

Parameter	Description
Rx Correct Frames	Total number of successfully received frames
Rx Jabber Errors	Total number of frames that are too long and have an invalid CRC
Rx Oversize Frames	Total number of received long frames with size over 1518 bytes and with valid CRC
Rx Undersize Frames	Total number of received short frames with size under 64 bytes and with valid CRC
Rx CRC Errors	Total number of received frames with invalid CRC
Tx Correct Frames	The number of frames successfully transmitted. When a valid PW connection is established the number should increase steadily

Displaying the Connection Statistics

Performance statistics collected on a pseudowire connection are displayed via the Connection Statistics screen.

➤ **To display the PW connection statistics information:**

1. From the Physical Layer menu (Monitoring > Physical Layer), select **Connection Statistics**.

   The Connection Statistics screen is displayed.

2. Click **Refresh** to refresh the screen.

➤ **To clear the PW connection statistics:**

- From the Connection Statistics menu, select **Reset Counters**.

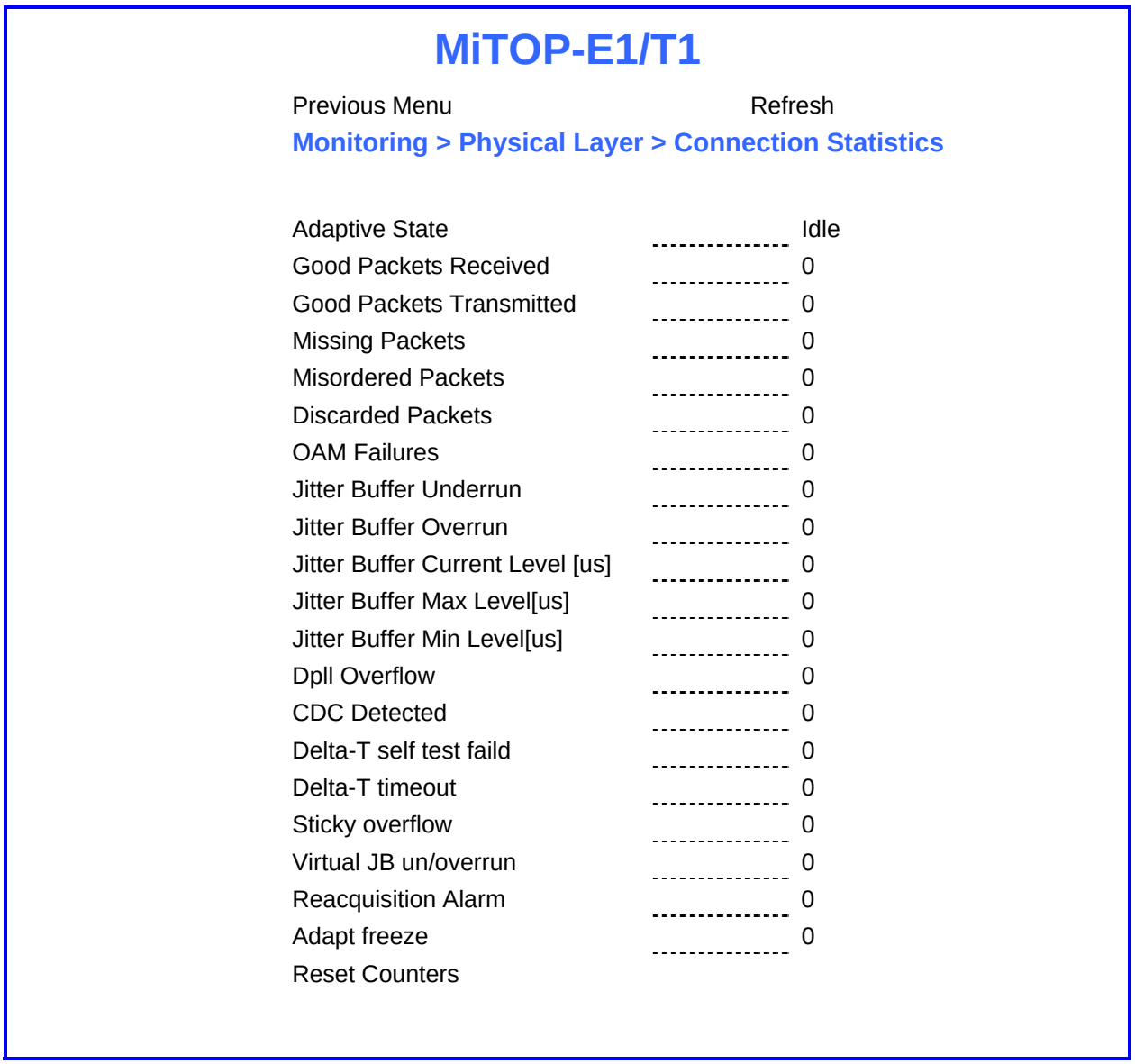


Figure 6-3. PW Connection Statistics Screen

Table 6-3. PW Connection Statistics Parameters

Parameter	Description
Adaptive State	Current state of the adaptive clock
Good Packets Received	Total number of good packets received on the PW connection
Good Packets Transmitted	Total number of good packets transmitted on the PW connection
Missing Packets	Total number of missing packets
Misordered Packets	Total number of packets that were successfully reordered
Discarded Packets	Total number of packets that were discarded. This counter is controlled by the Discarded By parameter (Configuration > Applications > Multi service over PSN > PW)
OAM Failures	Number of synchronization loss events on the OAM link

Parameter	Description
Jitter Buffer Current Level	Current jitter buffer level, see note below
Jitter Buffer Max Level	Maximum jitter buffer level reached after the last counter reset, see note below
Jitter Buffer Min Level	Minimum jitter buffer level reached after the last counter reset, see note below
Dpll Overflow, CDC Detected, Delta-T self test faild, Delta-T timeout, Sticky overflow, Virtual JB un/overrun, Reacquisition Alarm, Adapt freeze	Indications of the adaptive clock functionality, used for debug purposes

Note

- *To calculate the jitter buffer level (current, minimum or maximum) in bytes, use the following formula:*
  Jitter buffer level = currently displayed value × (32 × interface bit rate).
- *Maximum delay variation at the network can be calculated by subtracting the Jitter buffer Min level from the jitter buffer Max level.*

6.2 Handling Events

MiTOP-E1/T1 maintains a log file, which can hold up to 100 events (system messages). All events are time-stamped and have their severity indicated.

Displaying Events

➤ **To access the log file:**

- From the System menu, select **Log File**.

  The Log File is displayed.

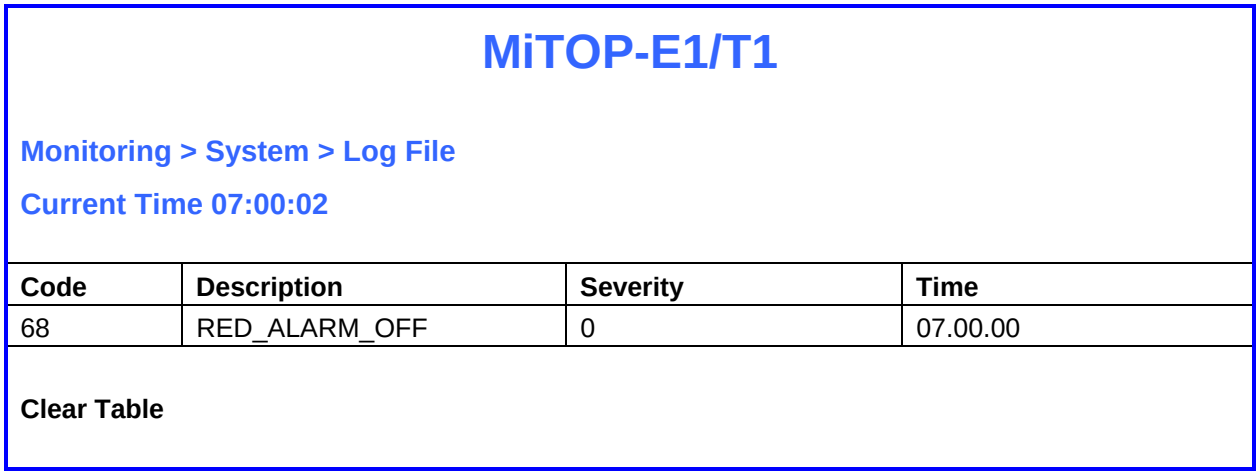


Figure 6-4. Log File

Clearing Events

➤ **To clear the log file:**

- From the Log File menu, click **Clear Table**

  All events are deleted from the log.

Table 6-4 presents the event types that appear in the log file.

Table 6-4. Event List

Event	Description	Corrective Action
Phy_Up	Ethernet physical link is up	None
Phy_Down	Ethernet physical link is down. One of the following can cause Ethernet interface failure: • MiTOP-E1/T1 has been removed from the host device or the SFP port on the host has failed. • MiTOP-E1/T1 shut down the Ethernet link, when the TDM interface failed (only when fault propagation is enabled). • MiTOP-E1/T1 is not compatible with the type or operation mode of the SFP port in the host device.	• Check the physical connection to the Ethernet interface. • If the fault propagation is enabled, check the TDM interface. • Check the SFP port of the host device. It must operate at 100 Mbps with full duplex.
TXDISABLE	TX Disable signal has been sent by the host device.	Check the signal input from the host device.
LOS	Loss of signal has been detected	• Check the E1/T1 cable connection. • Check input TDM signal.
BPV err exc	Bipolar violation errors exceeded threshold	"-"
BPV err	A bipolar violation error has been detected	"-"
frame slip exc	Frame slips exceeded threshold	"-"
CRC-4 exc	CRC-4 errors exceeded threshold	"-"
exec err ratio	Bit error rate of the link exceeded 10-3	"-"
AIS occurred	AIS has been detected	"-"
AIS red alm	AIS and loss of frame alignment have been detected	"-"
yellow alm	Remote loss of frame synchronizarion has been detected	"-"

6.3 Testing MiTOP-E1/T1

Diagnostic capabilities of MiTOP-E1/T1 include:

- Activating loopbacks (local and remote)
- Responding to T1 inband loopback activation code
- Sending RDI or AIS signals to the TDM equipment.

Running Diagnostic Loopbacks

➤ **To run a loopback:**

1. From the Diagnostics menu, select **Loopback state**, and choose the loopback that you intend to run (Local or Remote).
2. In the **Loop Time Out field**, enter a period of time (in seconds), after which the loopback is automatically disabled. Setting timeout to 0 disables the timeout.

Note *Only one loopback can be run at a time.*

MiTOP-E1/T1

Diagnostics

Loopback State	Disable
Loop Time Out (sec) [0–3600]	0
TRDI	Disable
TAIS	Disable

Figure 6-5. Loopback Menu

➤ **To disable a loopback:**

- From the Diagnostics menu, set the loopback state to **Disable**.

Local Loopback

MiTOP-E1/T1 can be set to start a local loopback to test the connection between the E1/T1 port and the PSN. In this mode, data coming from the PSN is both looped back to the PSN and transmitted towards the PBX connected to the E1/T1 port.

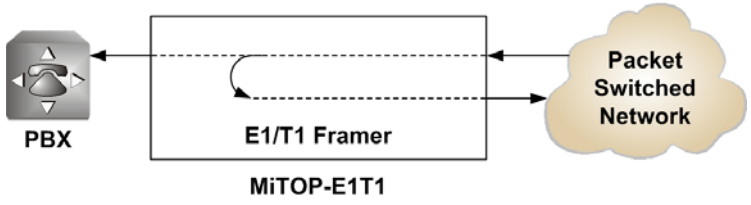


Figure 6-6. Local Loopback

Remote Loopback

MiTOP-E1/T1 can be set to start a remote loopback to test the connection between the E1/T1 port and the PBX. In this mode, data coming from the PBX is both looped back to the PBX and transmitted towards the PSN.

Note *Remote loopback can be activated only when MiTOP-E1/T1 operates with the internal clock.*

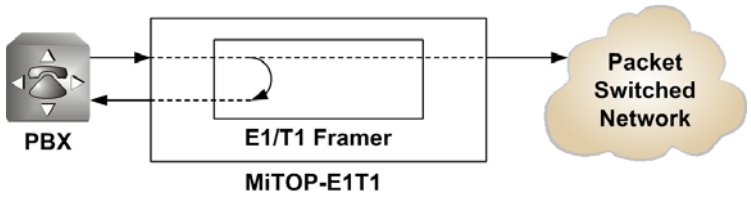


Figure 6-7. Remote Loopback

Activating T1 Inband Loopbacks

T1 physical loopbacks can be activated by receiving a loopback activation code from TDM equipment connected to the T1 port. When MiTOP-E1/T1 receives a loopback activation code, it closes a remote loopback.

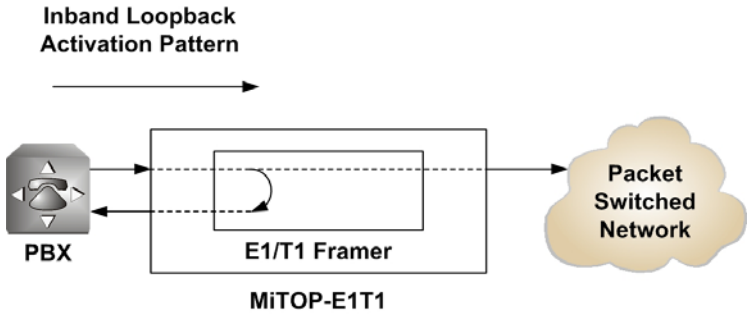


Figure 6-8. T1 Inband Loopback

Sending RDI or AIS to the TDM Equipment

MiTOP-E1/T1 can be configured to transmit RDI and AIS indications to the TDM equipment connected to the E1/T1 port.

➤ **To transmit RDI or AIS to the TDM equipment:**

- From the Diagnostics menu, set TRDI or TAIS to Enable.

  MiTOP-E1/T1 starts inserting RDI or AIS into TDM data sent to the adjacent E1/T1 device.

6.4 Technical Support

Technical support for this product can be obtained from the local distributor from whom it was purchased.

For further information, please contact the RAD distributor nearest you or one of RAD's offices worldwide. This information can be found at www.rad.com (offices – About RAD > Worldwide Offices; distributors – Where to Buy > End Users).

Appendix A
Connector Wiring

A.1 E1/T1 Connector

The E1/T1 interface terminates in an 8-pin RJ-45 connector, wired in accordance with *Table A-1*.

Table A-1. E1/T1 Connector Pinout

Pin	Function
1	Tx Ring
2	Tx Tip
3, 6, 7, 8	–
4	Rx Ring
5	Rx Tip
S=Conn. Body	FGND/GND

A.2 SFP Connector Pinout

Table A-2 lists the SFP connector pins and their functions.

Table A-2. SFP Connector Pinout

Pin No.	Name	Function
1	VeeT	Transmitter Ground
2	Tx Fault	NA
3	Tx Disable	Transmitter Disable
4	MOD-DEF2	Module Definition 2
5	MOD-DEF1	Module Definition 1
6	MOD-DEF0	Module Definition 0
7	Rate Select	NA
8	LOS	Loss of Signal

Pin No.	Name	Function
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inv. Received Data Out
13	RD+	Received Data Out
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmit Data In
19	TD-	Inv. Transmit Data In
20	VeeT	Transmitter Ground

Appendix B

Installing New Software Releases

This appendix presents procedures for downloading software to MiTOP-E1/T1. New software releases are downloaded to MiTOP-E1/T1 via the SFP-CA configuration unit.

B.1 Establishing a HyperTerminal Connection

Upgrading MiTOP-E1/T1 requires a PC with Windows XP SP2 installed and equipped with at least one USB port. The required HyperTerminal application is pre-installed.

Note *Do not connect the MiTOP-E1/T1 device to SFP-CA during this procedure.*

➤ To establish a HyperTerminal connection:

1. If the SFP-CA unit is not connected to your PC, connect power to SFP-CA and plug the USB connector of SFP-CA into a USB port on your PC.
2. Open the HyperTerminal application.

   The Connection Description dialog box for a new connection appears.
3. Specify a name for the HyperTerminal connection, and click **OK**.

   The Connect To dialog box appears.
4. Choose a virtual COM port, for example **COM8**, and click **OK**.

   The COM Properties dialog box appears.
5. Specify the settings as listed below and then click **OK**.
   - Bits Per Second: **115200**
   - Data Bits: **8**
   - Parity: None
   - Stop Bits: 1
   - Flow Control: None
6. Click **Properties**.

   The Connection Properties dialog box appears.

7. Select the Settings tab and under Emulation, choose **VT100**, and then click OK.

   The COM port configuration is complete, and the HyperTerminal connection is ready for use.

8. Close the HyperTerminal application.

B.2 Downloading the Software File

You can upgrade the MiTOP-E1/T1 device's software by downloading software via SFP-CA. The HyperTerminal application is used for the software download.

➤ **To upgrade the MiTOP-E1/T1 software:**

1. Verify that the upgrade image file provided is accessible from your PC.
2. Configure MiTOP-E1/T1 to the SW Download mode (see *Chapter 2*)
3. If the SFP-CA unit is not connected to your PC, connect power to SFP-CA and plug the USB connector of SFP-CA into a USB port on your PC.
4. Plug the miniature device into the SFP socket on the SFP-CA unit.
5. Open the HyperTerminal application and load the HyperTerminal connection that you established previously (see *Establishing a HyperTerminal Connection* above).

   The first screen appears indicating that the system is ready for downloading.

```
============================================================
=             (C) RAD Data Communication                   =
=                                                          =
=                  Software Download   ( version 1.0d02)   =
=                                                          =
=                                                          =
============================================================


1 – Download an application by YMODEM
```

Note

If you plug MiTOP-E1/T1 into SFP-CA before connecting the configuration unit to the PC, the upper section of the Download screen is not displayed; only the Download an Application by YMODEM option is visible.

1. Select Download an Application by YMODEM to start the procedure.

   A warning appears indicating that the flash will be corrupted.

2. Press **y** to confirm.

   Sectors are erased and the Send File screen appears, prompting you to specify the name and the location of the upgrade image file.

3. In the toolbar, select **Send File**.

   The Send File window appears.

4. In the Send File window, under **Protocol**, choose **Ymodem** from the list.

5. Under **Filename**, click **Browse** to navigate to the desired upgrade image file.

   - To start downloading, click **Send**; the Progress screen appears, reflecting the progress of the download. A message indicates if the download was completed or failed.
   - To close the screen but continue downloading, click **Close** after clicking **Send**.
   - To cancel the download after you started downloading (sending), click **Cancel**.
   - To abort the download and restore the previous state, press **a**.

Appendix C

I2C Interface Management

This chapter provides references for using the I2C interface and associated commands.

C.1 2-Wire Serial Link

MiTOP-E1/T1 complies with the MSA standard and has the same 2-wire serial link interface (I^2C) that carries the out-of-band protocol. The device follows the basic parameter map as outlined by the MSA (based on SFF 8472). *Figure C-1* illustrates the mapping of page A0 as seen by the host equipment.
The MiTOP-E1/T1 identification parameters reside on page A0.

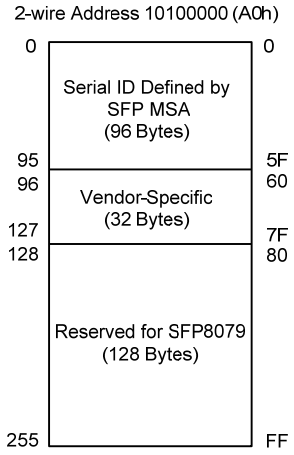


Figure C-1. Page A0 Mapping

The first sector contains addresses 0x00-0x5F that are reserved for identification parameters.

The second sector contains addresses 0x60 to 0x7E that are reserved for vendor specifics.

MiTOP-E1/T1 uses sixteen locations in the third sector (addresses 0x80 and up) for configuration, diagnostic, and status monitoring parameters.

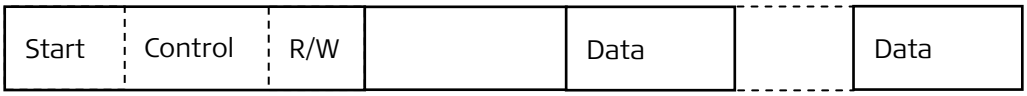
MiTOP-E1/T1 processes two message formats:

- **Two wire serial link message.** Used in standard I^2C to read the ID table parameters.
- **Management message.** The host sends information to MiTOP-E1/T1, encapsulated in the I^2C message for managing, configuring, and monitoring MiTOP-E1/T1.

Addresses and values are provided in hexadecimal format.

C.2 Serial Link Message Format

This message format defines the structure used to read the ID table parameters.



The process of reading the ID table parameters complies with the MSA document and consists of two main steps:

1. Write message from the host:
   - Includes I²C Control and Write bits in the first byte.
   - The Slave Address byte includes 0xA0h.
   - The Data byte includes 0x00, the first address to be read.
2. Read message from the host:
   - Includes I²C Control and Read bits in the first byte.
   - MiTOP-E1/T1 replies with acknowledgement (zero).
   - The Data byte is clocked out from MiTOP-E1/T1 to the host.
   - The host acknowledges each byte or replies with STOP to terminate the process.

Management Message Format

Two types of I²C message structures are transferred from the host to MiTOP-E1/T1 and vice versa see *Figure C-2*.

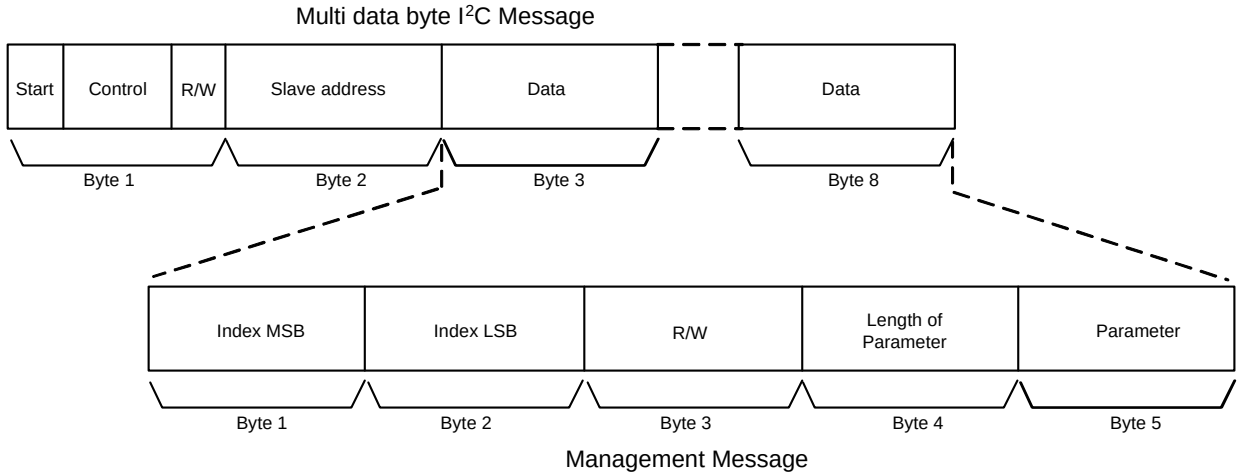


Figure C-2. Management Message Encapsulated in the Multi-Data byte I²C Message

The management message is encapsulated in the Data bytes of the I²C message (bytes 3–8). The slave address points to the reserved area in page 0 of the identification memory (addresses 0x80 to 0x9E).

The data bytes of the I²C message carry the message from the host to the MiTOP-E1/T1 device.

The host message structure may be a write message such as a configuration message or a read message like status. Messages are sent to MiTOP-E1/T1 in the format shown as described in *Figure C-3.*

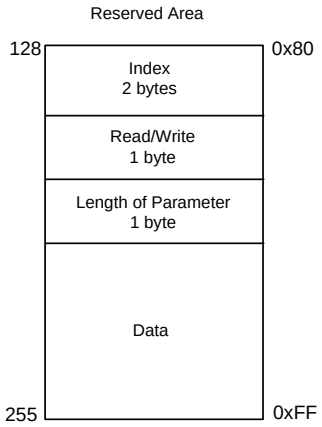


Figure C-3. Message Format

Index: written into addresses 0x80 and 0x81 – The Index bytes determine the command code of the host message.

Read/Write: written into address 0x82 – This byte determines if the command is a read or write operation.

Length: written into address 0x83 is the number of bytes the parameter comprises.

Parameter: written into addresses from 0x84. The parameter length must be exactly as defined in the Length field. Each I^2C message will carry up to eight bytes of management message.

Once the full message is stored, MiTOP-E1/T1 reads the message and responds with the respective read or write operation.

C.3 Management Procedure

The host is defined as the master and MiTOP-E1/T1 is the slave, only the host can start the management communication procedure.

The host accesses addresses 0x80–0x9E, in the same way that it accesses the SFP identification addresses (0x00–0x5F).

I^2C messages from the host are composed from read and write messages. In a read command, the read parameters (Index, R/W, and Length) are stored at addresses 0x80-0x83. Afterwards, MiTOP-E1/T1 receives the required data and stores it in address 0x84. The complete message is then delivered via I^2C to the host.

Read Message

I²C encapsulation structure:

- Includes I²C Control and Write bits in the first byte.
- Next byte contains 0x80 (as the first address).
- Next byte with the First byte of the Index (MSB).
- Next byte with the Second byte of the Index (LSB).
- Next byte contains 0x01 for a read operation.
- Byte contains 0x01 for the Length.
- MiTOP-E1/T1 gets the required data byte and stores it in address 0x84.

To read the required byte, the host sends a new I²C message with the following structure:

- I²C Control bits and Read bits in the first byte.
- Next byte contains 0x84 (the address that the parameter is read from).
- The content of address 0x84 is delivered to the host equipment.

Note

In the event that two or more bytes are to be read, two I²C messages are required to read addresses 0x84, 0x85, etc.

Write Message

I²C encapsulation structure:

- I²C Control and Write bits in the first byte.
- Next byte is 0x80 (the first address).
- Next byte contains the first byte of the Index (MSB) parameter.
- Next byte contains the second Index byte (LSB) parameter.
- Next byte is 0x00 for a write code operation.
- Byte with content of 0x01 for the Length.

From this stage the number of writes depends on the Length field.

Note

MiTOP-E1/T1 handles the write message only if the number of parameter bytes is equal to the Length field.

C.4 General Parameters

The following tasks can be performed:

- Identify if MiTOP-E1/T1 is E1 or T1
- Read the software version X.YZR, where each character in the version number is one byte
- Reset software
- Reset to factory defaults.

Table C-1. General Parameters

Index	R/W	Parameter Length	Description	Default
0x1	R	1	Module type • 0x10: Mitop FE/E1 • 0x11: Mitop FE/T1	
0x2	R	1	Software version X.YZR 0x00–0xFF	
0x3	R	1	Software version X.YZR 0x00–0x63	
0x4	R	R	Software version X.YZR. All values are in ASCII code. • A: Alpha 0x41 • B: Beta 0x42 • D: Development 0x44 • E: End of development 0x45 • Null: Official release 0x00	
0x5	R	R	Software version X.YZR 0x00–0x63	
0x6	R	1	HW version X.YZR 0x00–0xFF	
0x7	R	1	HW version X.YZR 0x00–0x63	
0x8	R	1	HW version X.YZR. All values are in ASCII code. • A: Alpha 0x41 • B: Beta 0x42 • D: Development 0x44 • E: End of development 0x45 • Null: Official release 0x00	

Index	R/W	Parameter Length	Description	Default
0x9	R	1	HW version X.YZR 0x00–0x63	
0xa	R	1	Boot version X.YZR 0x00–0xFF	
0xb	R	1	Boot version X.YZR 0x00–0x63	
0xc	R	1	Boot version X.YZR. All values are in ASCII code. • A: Alpha 0x41 • B: Beta 0x42 • D: Development 0x44 • E: End of development 0x45 • Null: Official release 0x00	
0xd	R	1	Boot version X.YZR 0x00–0x63	
0X14	R	6	MAC address	
0X15	R	4	System uptime 0–0xffffffff seconds	
0x12C	W	1	Software reset and factory default • 0x02: Reset software • 0x03: Set to factory defaults	
0x12D	R+W	12	Host IP address, default gateway and mask • Bytes 0–3: IP address • Bytes 4–7: Default gateway • Bytes 8–11: Mask	IP: 192.168.205.1 Default gateway: 0.0.0.0 Mask: 255.255.255.0
0x12f	R+W	1	Management access Digit 1 – LAN • 0: Disable • 1: Enable	0x2: Enable management via LAN
0x130	R+W	1	I2Cmode • 0: Without stretching • 1: Normal	0x1: Normal operation

The I^2C specifications allow the slave (SFP) to elongate read or write cycles executed by the host, by pulling the clock signal down. This indicates to the host that the SFP is not ready to complete the cycle. Some host equipment does not support this cycle stretching functionality. To handle those cases, MiTOP-E1/T1 can be configured to work with or without cycle stretching functionality.

During the first five seconds after MiTOP-E1/T1 is inserted into the host SFP socket, MiTOP-E1/T1 responds to I^2C messages without using cycle stretching functionality. After the first five seconds MiTOP-E1/T1 handles I^2C messages according to the configured I^2C cycle stretching mode:

- Normal operation – MiTOP-E1/T1 users I^2C cycle stretching. This is the default mode.
- Without stretching – MiTOP-E1/T1 responds to messages from the host without using cycle stretching functionality. This allows hosts that do not support cycle stretching to operate successfully, with the minimum of error cycles.

C.5 Status Parameters

Table C-2. Status Parameters

Index	R/W	Parameter Length	Description
0x3E8	R	1	E1/T1 status 1 – Active, 0 – Inactive • Digit 0: LOS • Digit 1: LOF • Digit 2: RAIS • Digit 3: RYEL (yellow alarm), T1 only • Digit 4: RDI, E1 only
0x3E9	R	1	Ethernet and SFP status 1 – Active, 0 – Inactive • Digit 0: Ethernet status • Digit 1: Tx Disable
0x400	R	4	Bundle good packets received
0x401	R	4	Bundle good packets transmitted
0x402	R	4	Bundle sequence errors
0x403	R	4	Bundle discarded packets
0x404	R	4	Bundle jitter buffer underflow
0x405	W	1	Clear bundle statistics
0x406	R	4	Bundle jitter buffer overflow
0x407	R	4	Current jitter buffer level
0x408	R	4	Max jitter buffer level
0x410	R	4	Min jitter buffer level

Index	R/W	Parameter Length	Description
0x409	R	1	Bundle connectivity status • 0: OAM disable • 1: Out of sync • 2: Not valid • 3: Sync
0x40A	R	1	Bundle HW lack of RX buffers • 0: No • 1: Yes
0x40B	R	1	Bundle packet length error • 0: No • 1: Yes
0x40C	R	1	Bundle RX loss sync • 0: No • 1: Yes
0x40D	R	1	Bundle RX remote fail • 0: No • 1: Yes
0x40E	R	1	Bundle RX LBIT modifier 0–3
0x40F	R	1	Bundle RX length mismatch discard • 0: No • 1: Yes

C.6 Configuration Parameters

Table C-3. Configuration Parameters

Index	R/W	Parameter Length	Description	Default
0x514	R+W	1	E1 and T1 configuration Digits 0–2, T1 only • 000: 0–133 ft • 001: 133–266 ft • 010: 266–399 ft • 011: 399–533 ft • 100: 533–655 ft • 101: -7.5 db CSU • 110: -15 db CSU • 111: -22.5 db CSU	Digits 0–2: 001 Digit 3: 1, Framed Digit 4: 0, HDB3 Digit 7: 0, CRC enable for E1 or 1

Index	R/W	Parameter Length	Description	Default
			Digit 3, framing mode • 0: Unframed • 1: Framed Digit 4, line code • 0: HDB3/B8ZS • 1: AMI Digit 5, not in use Digit 6, not in use Digit 7, CRC, E1 only • 0: Enable • 1: Disable Digit 7, ESF-D4, T1 only • 0: D4 • 1: ESF	
0x515	R+W	1	Rx sensitivity E1 • 0: -12 db • 1: -43 db T1 • 0: -36 db • 1: -15 db	0
0x51A	R+W	1	TRDI/Yellow alarm Digit 0, Transmit RDI/Yellow alarm • 0: Normal operation • 1: Sends RDI/Yellow alarm	0: Normal operation
0x531	R+W		Fault propagation caused by: • Digit 0: LOS • Digit 2: AIS • Digit 3: RDI	0: Disabled
0x532	R+W		Tx_disable behavior • 00: NA (no impact) • 01: 3 State • 02: AIS	0: No impact
0x535	R+W	2	Fault propagation timeout: 0–3600 seconds	0
0x537	R+W	1	LOS behavior caused by • Digit 0: LOS • Digit 2: AIS • Digit 3: RDI	0: Disabled

Index	R/W	Parameter Length	Description	Default
0x541	R	1	Ethernet rate • 0: 100 Mbps • 1: 1000 Mbps	1: 100 Mbps
0x543	R+W	1	Tx clock • 0x0: Internal • 0x1: LBT • 0x2: Adaptive	0x0: Internal
0x550	R+W	1	Adaptive source quality • 0: Stratum 1 • 1: Stratum 2 • 2: Stratum 3 • 3: Stratum 3e • 4: Stratum 4	2: Stratum 3
0x551	R+W	1	Adaptive clock mode • 0: Auto • 1: Manual	0: Auto
0x552	R+W	1	Adaptive acquisition switch • 0: Off • 1: On	1: On
0x553	R+W	1	Adaptive smart delta switch • 0: Off • 1: On	1: On
0x554	R+W	1	Adaptive smart self test • 0: Off • 1: On	0: Off
0x555	R+W	1	Adaptive smart delta timeout • 0: Off • 1: On	1: On
0x556	R+W	1	Adaptive BW adaptation switch • 0: Off • 1: On	1: On
0x557	R+W	1	Adaptive const delay switch • 0: Off • 1: On	1: On
0x558	R+W	1	Adaptive freeze system • 0: Off • 1: On	0: Off

Index	R/W	Parameter Length	Description	Default
0x559	R+W	1	Adaptive BW adapter low level • 0: Off • 1: On	0: Off
0x55A	R+W	1	Adaptive BW adapter upper level • 0: Off • 1: On	0: Off
0x55B	R+W	1	Adaptive JB reset enable • 0: Off • 1: On	0: Off
0x55C	R+W	1	Adaptive SW reset enable • 0: Off • 1: On	1: On
0x55d	R+W	2	Adaptive CDC threshold track1	
0x55e	R+W	2	Adaptive CDC threshold track2	
0x55f	R+W	2	Adaptive frequency deflection	
0x560	R+W	2	Adaptive threshold exit sleep	
0x561	R+W	2	Adaptive SDT threshold	
0x562	R+W	2	Adaptive SDT threshold hysteresis	
0x563	R+W	2	Adaptive sliding window	
0x564	R+W	2	Adaptive ADEV target	
0x565	R+W	2	Adaptive ADEV target zone	
0x570	R	1	PW index	
0x571	R+W	12	PW name low First part of the PW name	
0x572	R+W	12	PW name high Second part of the PW name	
0x58E	R+W	1	PW discarded by 0–15	15
0x574	R+W	4	PW source IP	IP: 0.0.0.0
0x575	R	1	PW type • 0: SAToP • 1: CESoPSN	1: CESoPSN
0x576	R+W	1	PW PSN type • 0: MPLS • 1: UDP • 3: MEF	1: UDP

Index	R/W	Parameter Length	Description	Default
0x577	R+W	1	PW peer number	1
0x578	R	1	PW owner 0: Manually	0: Manually
0x579	R+W	4	PW outbound VC label	
0x57A	R+W	1	PW inbound VC label	
0x57D	R+W	1	PW IP cfg ToS	
0x57E	R+W	4	PW PSN ingress tn1 index	
0x57F	R+W	4	PW PSN egress tn1 index	
0x580	R+W	1	PW MPLS EXP bits	
0x581	R+W	1	PW MPLS TTL	
0x582	R+W	1	PW VLAN tag disable • 0: Disable • 1: Enable	0: Disable
0x583	R+W	4	PW VLAN ID 1–4095	1
0x584	R+W	1	PW VLAN priority 0–7	0
0x585	R+W	4	PW payload size, frames in a packet >=2	2
0x586	R+W	4	PW payload size, bytes	4
0x587	R+W	4	PW jitter buffer CESoPSN: 1500–200000 SAToP: 50–200000	1500
0x588	R	1	PW E1/T1 port number	
0x589	R	1	PW bundle timeslots	31
0x58A	R+W	1	PW connection status 1: Enable 0: Disable	0: Disable
0x58B	R+W	1	PW OAM status 1: Enable 0: Disable	1: Enable
0x58C	R	6	PW source MAC address	
0x58D	R+W	1	PW multiplexing 1: Destination 0: Source	0: Source

Index	R/W	Parameter Length	Description	Default
0x58F	R+W	1	PW Unreachable detection 1: Enable 0: Disable	0: Disable
0x590	R+W	1	Packet reordering 1: Enable 0: Disable	1: Enable
0x595	R	1	Peer number	0
0x596	R+W	12	Peer name low First part of the peer name	
0x597	R+W	8	Peer name high Second part of the peer name	
0x598	R+W	4	Peer IP	
0x599	R+W	6	Peer MAC	
0x59A	R+W	4	Peer next hop	0.0.0.0

C.7 Statistic Parameters

The statistics below are updated every second. The MiTOP-E1/T1 host collects the statistics and calculates the intervals. Two bytes are reserved for each counter.

Table C-4. Statistic Parameters

Index	R/W	Parameter Length	Description
0x6F6	R	4	Current ES
0x6F7	R	4	15 Min ES
0x6F8	R	4	Current SES
0x679	R	4	15 Min SES
0x67A	R	4	Current UAS
0x67B	R	4	15 Min UAS
0x67C	R	4	Current BES
0x67D	R	4	15 Min BES
0x702	R	4	Last BPV
0x703	R	4	Max BPV
0x704	R	4	Rx Correct Frames
0x705	R	4	Rx Jabber Errors

Index	R/W	Parameter Length	Description
0x706	R	4	Rx Oversize Frames
0x707	R	4	Rx Undersize Frames
0x720	R	4	Rx CRC Errors
0x721	R	4	Tx Correct Frames
0x722	R	4	Tx Single Collisions
0x723	R	4	Tx Multiple Collisions
0x724	W	1	Clear Eth Statistics
0x6F4	W	1	Clear Statistics
0x6F5	R	4	Elapsed time (s)

C.8 Diagnostic Parameters

Table C-5. Diagnostic Parameters

Index	R/W	Description	Default
0x708	R + W	0x0: Normal operation 0x1: LLB 0x2: RLB 0x5: AIS	0: Normal operation
0x710	R+W	Loop timeout 0–3600 s	

C.1 SFP Identification Fields

Table C-6. MiTOP-E1/T1 SFP ID fields

Field Name	Data Address	MiTOP-E1	MiTOP-T1
Identifier	0	SFP Value 03	SFP Value 03
Ext. Identifier	1	04h	04h
Connector	2	22	22
Transceiver	3	0	0
	4	0	0
	5	0	0

Field Name	Data Address	MiTOP-E1	MiTOP-T1
	6	0	0
	7	0	0
	8	0	0
	9	0	0
	10	0	0
Encoding	11	0	0
BR_Nominal	12	0	0
Rate Identifier	13	0	0
Length (9u km)	14	0	0
Length (9u 100m)	15	0	0
Length (50u 10m)	16	30	30
Length (62.5u 10m)	17	0	0
Length (Copper 1m)	18	0	0
Length (OM3 10m)	19	0	0
Vendor Name	20–35	RAD Data Comm (All unused ASCI fields must be set to 20h)	RAD Data Comm (All unused ASCI fields must be set to 20h)
Unallocated	36	0	0
Vendor OUI	37–39	0	0
Vendor PN	40–55	MiTOP-FE-E1 or MiTOP-GE-E1 (All unused ASCI fields must be set to 20h)	MiTOP-FE-E1 or MiTOP-GE-E1 (All unused ASCI fields must be set to 20h)
Vendor rev	56–59	1.0	1.0
Wavelength	60–62	0	0
CC_BASE	63		
Options	64	0	0
Options	65	12h	12h
BR, max	66	0	0
BR, min	67	0	0
Vendor SN	68–83	0	0
Date code	84–91	0	0
Diagnostic monitoring type	92	0	0

Field Name	Data Address	MiTOP-E1	MiTOP-T1
Enhanced Options	93	0	0
SFF-8472 Compliance	94	0	0
CC_EXT	95		

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